TM 11-4002

WAR DEPARTMENT TECHNICAL MANUAL

RADIO RECEIVERS BC-314, -C, -D, -E, AND -G; BC-344, AND BC-344-D, REPAIR INSTRUCTIONS

WAR DEPARTMENT • MAY 1945

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TM 11-4002, Radio Receivers BC-314, -C, -D, -E, and -G; BC-344 and BC-344-D, Repair Instructions, is published for the information and guidance of all concerned.

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Refer to FM 21-6 for explanation of distribution formula.

WARNING

HIGH VOLTAGE

is used in the operation of
this equipment.

CONTENTS

SECTION I

DESCRIPTION OF RADIO RECEIVERS BC-314, -C, -D, -E, AND -G; BC-344, AND BC-344-D[1]

1. General

a. Radio Receivers BC-314-(*) and BC-344-(*), except for power supply, are basically identical. Radio Receiver BC-314-(*) uses a battery-operated dynamotor; Radio Receiver BC-344-(*) operates from an a-c (alternating-current) power supply. Superheterodyne receivers designed for use in vehicles or in fixed stations, they are capable of receiving voice, tone, or c-w (continuous-wave) transmitted signals over the frequency range of 150 to 1,500 kc (kilocycles). The frequency range is divided into four bands: 150 to 260 kc, 260 to 450 kc, 450 to 820 kc, and 820 to 1,500 kc. The BAND CHANGE switch controls the choice of frequency range. A VERNIER control equipped with a locking device and a FAST TUNING control are provided for tuning. An ALIGN INPUT control mounted on the front panel provides a means of obtaining the greatest sensitivity at any one dial setting. Figures 1 and 2 show front views of these receivers.

[1] Refer to TM 11-850 for installation, operation and other maintenance data on these equipments.

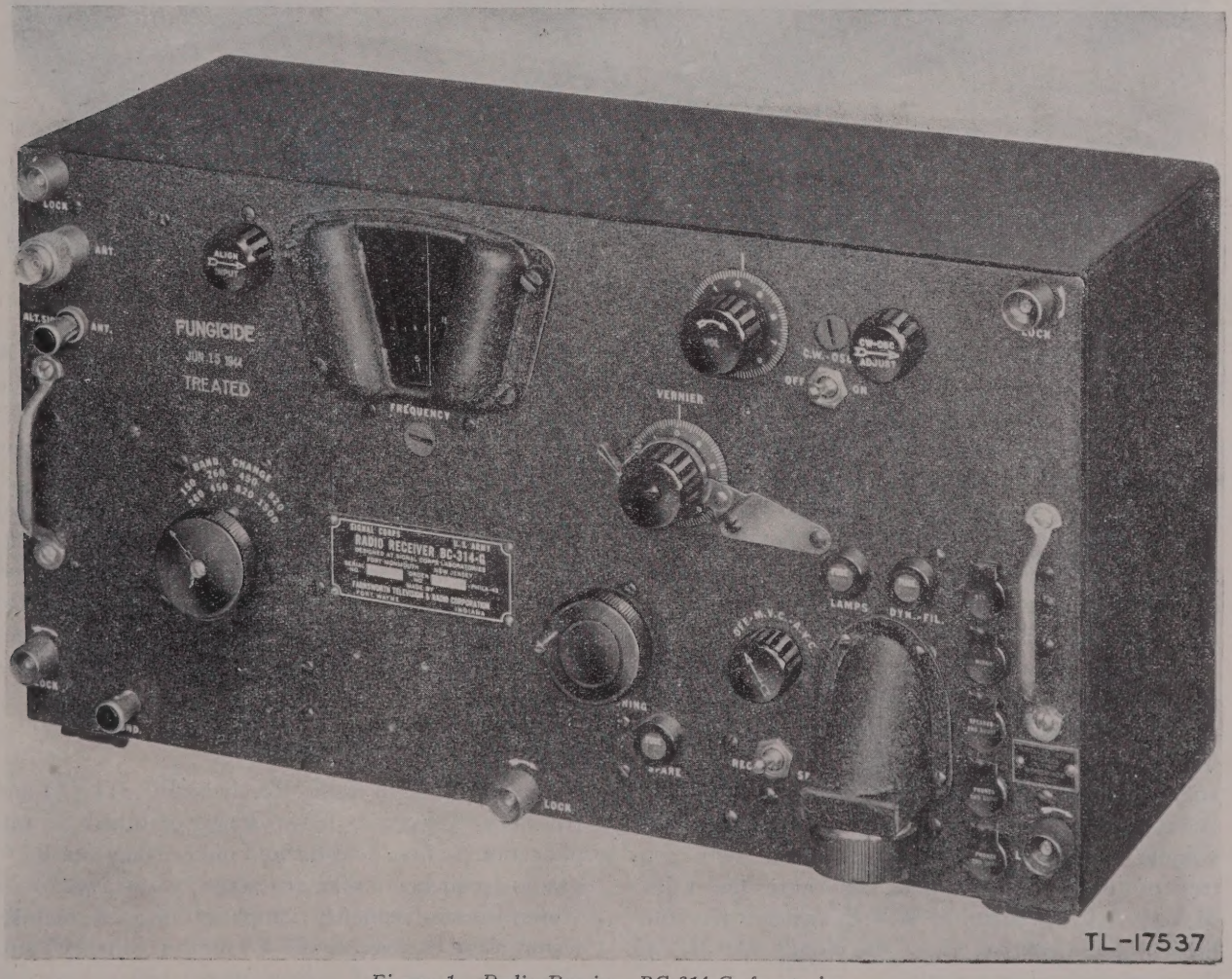


Figure 1. Radio Receiver BC-314-G, front view.

Figure 2. Radio Receiver BC-344-D, front view.

b. Throughout this manual, where text applies equally to all models of a given series, the suffix letter is omitted and the symbol (*) is used. For example, Radio BC-314-(*) refers to Radio Receivers BC-314, -C, -E, and -G; Radio Receiver BC-344-(*) refers to Radio Receivers BC-344 and BC-344-D. A specific model letter is used only when particular models must be identified. If no differences occur, all models of both designs are referred to as the receiver.

c. An a-v-c (automatic-volume-control) circuit is incorporated in the receiver and may be used or cut out of the circuit as needed, by turning the OFF-M.V.C.-A.V.C. control to either M.V.C. (manual-volume-control) or A.V.C. Turning the OFF-M.V.C.-A.V.C. control to A.V.C. switches the automatic volume control into the circuit, providing a-v-c- control of the received signal. Turning the OFF-M.V.C.-A.V.C. control to M.V.C. switches the automatic volume control out of the circuit. At M.V.C. the receiver is most sensitive.

d. A beat-frequency oscillator is incorporated in the receiver so that c-w signals may be received. A C.W.-OSC. ON-OFF switch is used to turn the beat-frequency oscillator on or off. The CW-OSC-ADJUST control is used to change the pitch of c-w signals.

e. The receiver is so designed that the individual r-f (radio-frequency) stages, r-f oscillator, c-w oscillator, and power supply components can be removed from the chassis with a minimum of disturbance to other parts. This type of construction provides effective shielding between stages, and facilitates maintenance.

2. Over-all System Function

The circuit used in Radio Receivers BC-314-(*) and BC-344-(*) consists of two stages of tuned r-f amplification; a first detector and mixer stage; an RFO (radio-frequency oscillator) stage; two stages of i-f (intermediate-frequency) amplification; a second detector, a-v-c rectifier, first a-f (audio-frequency) amplifier stage; an a-f output stage; and a beat-frequency (or c-w) oscillator stage, to provide a beat

note for c-w reception. A variable selectivity i-f circuit is incorporated in Receivers BC-314 and BC-344. Figure 3 shows a simplified block diagram of the receivers.

3. Simplified Circuit Analysis

Two stages of r-f amplification provide a high degree of selectivity and sensitivity, at the same time rejecting interfering signals at intermediate or image frequencies. The RFO stage provides a local oscillator signal which beats against the incoming signal in the first detector and mixer stage to produce an i-f signal. The i-f stages provide additional selectivity and amplification. The second detector stage (also a-v-c rectifier and first a-f amplifier) demodulates the signal, supplies a-v-c voltage to the preceding r-f and i-f amplifiers and the mixer stage, and amplifies the audio component. Further amplification is supplied by the a-f output stage. The c-w oscillator stage produces an r-f signal which differs from the i-f signal at an audio-frequency. The resultant beat note permits c-w reception. Figure 4 shows a simplified functional circuit diagram of the receivers. For detailed functioning of circuits, see TM 11-850.

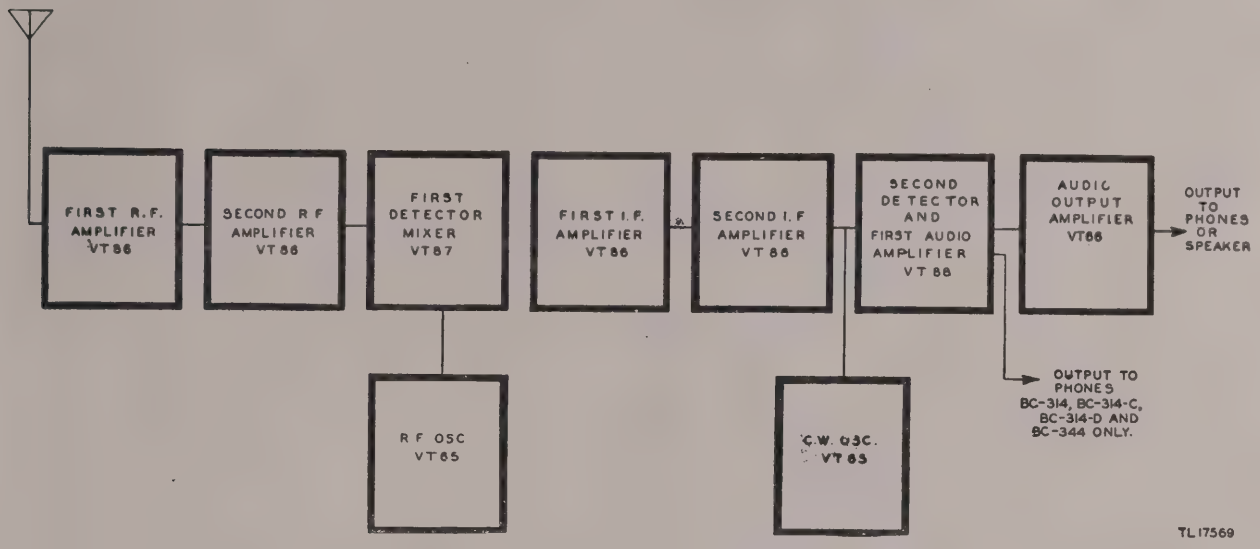


Figure 3. Radio Receivers BC-314-(*) and BC-344-(*), block diagram.

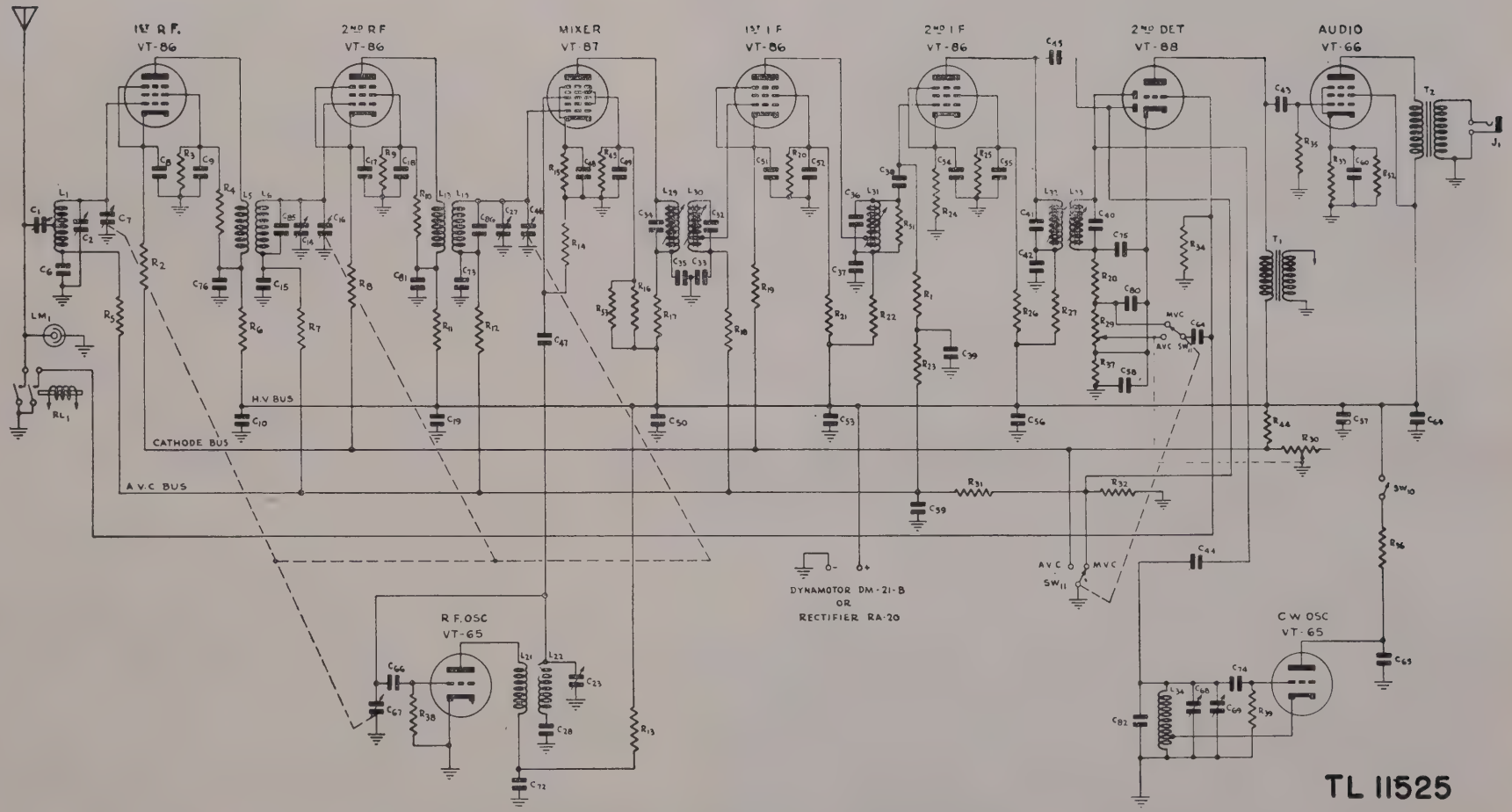


Figure 4. Radio Receivers BC-314-(*) and BC-344-(*), simplified functional circuit diagram.

DIFFERENCES BETWEEN MODELS

4. Functional Differences

Functional differences in Radio Receivers BC-314-(*) and BC-344-(*) are listed below:

a. RADIO RECEIVER BC-314-(*).

Radio Receiver	External voltage supply	Input power	Oscillator compartment heaters	SELECT control system	Weight (lb)	Power supply
BC-314	12-14 v dc	80-100	x[a]	x[a]	58	Uses Dynamotor DM-17-A.
BC-314-C	12-14 v dc	50-60		y[b]	56	Uses Dynamotor DM-21-(*)[c]
BC-314-D	12-14 v dc	50-60			56	Uses Dynamotor DM-21-(*)
BC-314-E	12-14 v dc	50-60			56	Uses Dynamotor DM-21-(*).
BC-314-G	12-14 v dc	50-60			56	Uses Dynamotor DM-21-(*)

[a] x indicates model in which functional difference appeared.
[b] y indicates a SELECT control which provides adjustment of the selectivity and is incorporated in the BC-314 and BC-344 only.
[c] Dynamotor DM-21-(*) refers to Dynamotors DM-21-A, -B, -E, -G, -J, -L, -M, and -P.
Note: In Radio Receiver BC-314-E, the antenna relay disables antenna circuit and first audio circuit, and all phone jacks are marked PHONES SECOND AUDIO.

b. RADIO RECEIVER BC-344-(*).

Radio Receiver	External voltage supply	Input power	Oscillator compartment heaters	SELECT control on front panel	Weight (lb)	Power supply
BC-344	110-120 v dc	75	x[a]	x[a]	61.5	Uses Rectifier RA-20
BC-344-D	110-120 v dc	75			61.5	Uses Rectifier RA-20

[a] x indicates model in which functional difference appeared.
Note: In radio Receiver BC-344-D, antenna relay disables antenna circuit and first audio circuit, and all phone jacks are marked PHONES SECOND AUDIO.

5. Design Differences

Design differences in the various models of the receivers are listed below:

a. RADIO RECEIVER BC-314-(*).

Design differences	BC-314	BC-314-C	BC-314-D	BC-314-E	BC-314-G
Thermostatically controlled heater in r-f oscillator compartment removed.		x	x	x	x
All phone jacks second audio.				x	x
Antenna disabling relay also disables first audio circuit.				x	x
SELECT control removed.		x	x	x	x

Note: x indicates model in which change was incorporated.

b. Radio Receiver BC-344-(*).

Design differences	BC-344	BC-344-D
Thermostatically controlled heater in r-f oscillator compartment removed.		x
All phone jacks second audio.		x
Antenna disabling relay also disables first audio circuit.		x
SELECT control removed.		x

Note: x indicates model in which change was incorporated.

INITIAL REPAIR PROCEDURES

6. General.

Note. Before making any repairs or adjustments, all modification work orders must be applied. Refer to War Department Pamphlet 12-6 for list of applicable modification work orders.

The repair information in this and the following sections is presented in the order in which the repairman actually should perform the various operations on the equipment in the repair shop. This procedure permits repair of the equipment in the shortest time possible, resulting in sensitivity, selectivity, and over-all performance of the set comparable to that of new equipment.

7. Tools, Test, and Cleaning Equipment

The following items should be available for repairing and servicing this equipment:

a. Tools and Accessories.

Item	Description
Screwdrivers and pliers.	Assorted sizes.
Alignment tools.	Fiber.
Soldering iron and solder.	
Capacitor.	250-mmf; mica; for r-f alignment.
Resistor.	300-ohm; noninductive; for i-f alignment.
Headset or loudspeaker.	4,000-ohm impedance.
Battery	12- or 24-volt.
Battery cord.	
Plug PL-55 (or equivalent).	For output meter.

b. Test Equipment.

Item	Description
Signal generator.	Covering frequencies of 92.5 kc for i-f alignment and 150 kc to 1,500 kc for r-f alignment; having a metered or calibrated output voltage of approximately 0 to 1 volt, and providing 400-cycle, 30-percent modulation.
Audio signal generator.	
Frequency meter.	Covering frequencies of 92.5 kc to 1,500 kc; signal generator frequency check.
Voltohmmeter.	Sensitivity of 1,000 ohms per volt; measuring a-c or d-c voltages from 10 to 500 volts, and resistances from 1 ohm to 15 megohms.
Voltohmmeter.	Sensitivity of 20,000 ohms per volt; measuring a-c or d-c voltages from 10 to 500 volts, and resistances from 1 ohm to 15 megohms.
Voltmeter.	Vacuum-tube; measuring a-c and d-c voltages from 0 to 100 volts.
Output meter.	4,000-ohm impedance; 100-volt range.
Tube tester.	

c. Cleaning Equipment.

Item	Description
Cleaning fluid.	Solvent, Dry-cleaning, Federal Specification P-S-61a.
Petroleum spirits.	
Brushes.	Paint; ½-in. to 3-in.; assorted sizes.
Pipe cleaners.	Tobacco pipe.
Clean cloths.	Lint-free.
Sandpaper.	#0000.
Crocus cloth.	

8. Removal of Tubes

No tubes, with the exception of the c-w oscillator and r-f oscillator tubes, are inclosed; they may be removed by lifting grid caps and pulling tubes out of sockets. To remove the c-w oscillator tube, remove the top cover of the c-w oscillator shield (fig. 11), lift the grid cap, and pull the tube out of the socket. To remove the r-f oscillator tube, open the hinged cover of the r-f oscillator compartment (fig. 11), lift grid cap, and pull the tube out of the socket.

9. Removal of Dynamotor or Rectifier

To remove the dynamotor or rectifier assembly from the chassis, unscrew the two screws on top of the chassis (fig. 11). Turn the chassis upside down and remove the screw pin from the inner hinge. Swing

the dynamotor or rectifier assembly away from the panel and disconnect the leads from the dynamotor terminal board. Remove the screw pin from the outer hinge and lift the assembly from the chassis.

10. Cleaning, Inspection, and Lubrication of Chassis Assembly

a. Cleaning. Thorough cleaning of the receiver is necessary to insure optimum performance by preventing corrosion, rust, and dust from damaging parts or causing arc-over or low resistance leakage between high-voltage points and ground. Remove loose dust and dirt with a brush or blower. With a brush or cloth and solvent, dry-cleaning, Federal Specification P-S-661a, remove dirt or grease which adheres to the chassis or parts. Remove the shield covers from the r-f, detector, and oscillator sections; clean the wave band switches with a small brush or pipe cleaner and dry-cleaning solvent. Clean the tuning capacitor bearings and rotor grounding springs with dry-cleaning solvent.

b. Inspection. After a receiver has been thoroughly and carefully cleaned, make a visual inspection of parts and wiring for rust, corrosion, loose connections, frayed or burned insulation, loose screws, and burned or charred resistors and coils. Carefully inspect tube sockets for broken contacts, wave band switches for loose or bent contacts or broken insulation, and terminal boards for broken lugs and signs of burning. Inspect and tighten all loose tuning dial gears, setscrews, and antenna relay contacts. See WD Pamphlet 12-6 to determine that all modifications have been incorporated.

c. Lubrication. The receiver tuning dial bearings and gears are lubricated at the time of manufacture with sufficient lubricant intended to last the life of the equipment under normal conditions; however, if lubrication becomes necessary after cleaning or because of abnormal use, lubricate the parts as directed in figure 5.

11. Cleaning, Inspection, and Testing of Tubes

a. Cleaning. Clean the tubes with a cloth moistened with dry-cleaning solvent; if necessary, clean the grid caps and prongs with crocus cloth.

b. Inspection. Inspect the tubes for cracks in glass or base, or for bent or broken prongs.

c. Testing. Test the tubes for low emission, leakage, and short circuits with a tube tester, or by placing doubtful tubes in a receiver known to be operating normally.

12. Dynamotor Repair

a. Preliminary Inspection. Remove the dynamotor assembly from the receiver chassis as directed in paragraph 9. Remove the cover from the dynamotor assembly. Wipe off loose external dirt and dust with a cloth moistened with petroleum spirits. Test the dynamotor on available dynamotor test equipment for voltage output at no load and at rated load; check for vibration and sparking at brushes. Tag the dynamotor to indicate faults.

Note. Replace dynamotors which have open windings, defective bearings, or worn commutators, with new complete units.

b. Cleaning (fig. 6). Do not dismantle dynamotors which operate normally and have only small deposits of carbon dust on brush holders. Clean them with a cloth moistened with petroleum spirits. Dismantle dynamotors which show evidence of excessive use and large deposits of carbon dust and grease; clean as follows:

(1) Remove the dynamotor from the housing by removing the four screws in each end of the case and disconnecting the leads.

(2) Remove the brush-holder caps and brushes on both low-voltage and high-voltage ends. Mark each brush so that it can be replaced in the same position in the same holder.

(3) Disconnect the leads to the brush holders, and mark each lead so that it may be connected properly when the unit is reassembled.

(4) Remove the nuts on the tie rods at the high-voltage end, and remove the bearing bracket.

(5) Pull out the armature.

(6) Remove the bearing bracket from the low-voltage end.

(7) Clean the bearing brackets, brush holders, bearing cover plates, and spacer shims with a cloth moistened with petroleum spirits.

(8) Blow loose dust and dirt out of stator assembly; if necessary, clean metal parts with #0000 sandpaper and petroleum spirits. Blow out resultant sand and metal fillings with compressed air. Field coils may be cleaned with a small sash brush and wiped with a cloth moistened with petroleum spirits.

(9) Clean the armature, including the commutator, with a cloth moistened with petroleum spirits and wipe with a clean cloth.

(10) If the commutator is slightly rough, smooth with #0000 sandpaper. Remove sand and metal fillings with a small piece of coarse canvas. Cover the bearings before cleaning the armature and commutator.

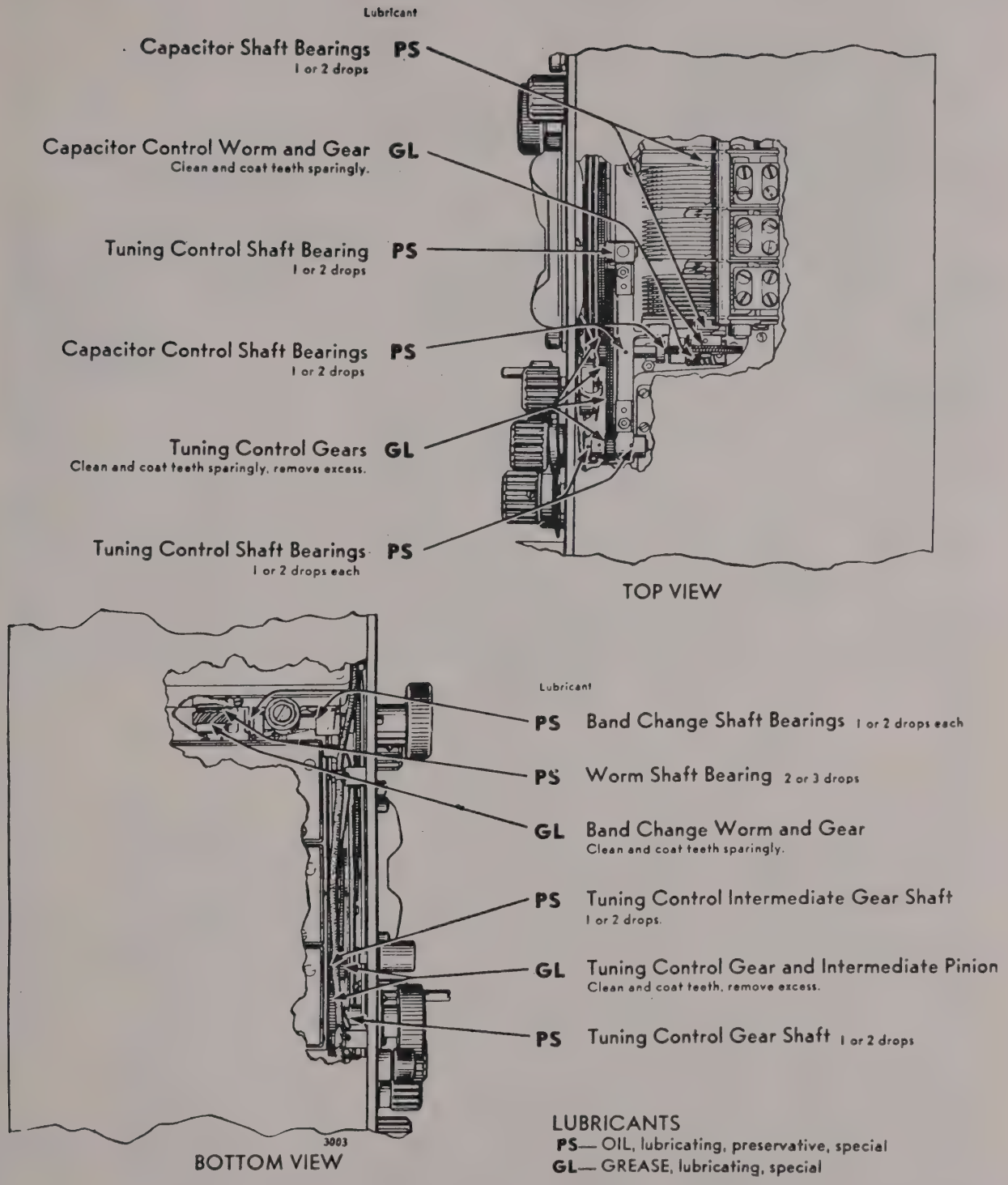


Figure 5. Lubrication data.

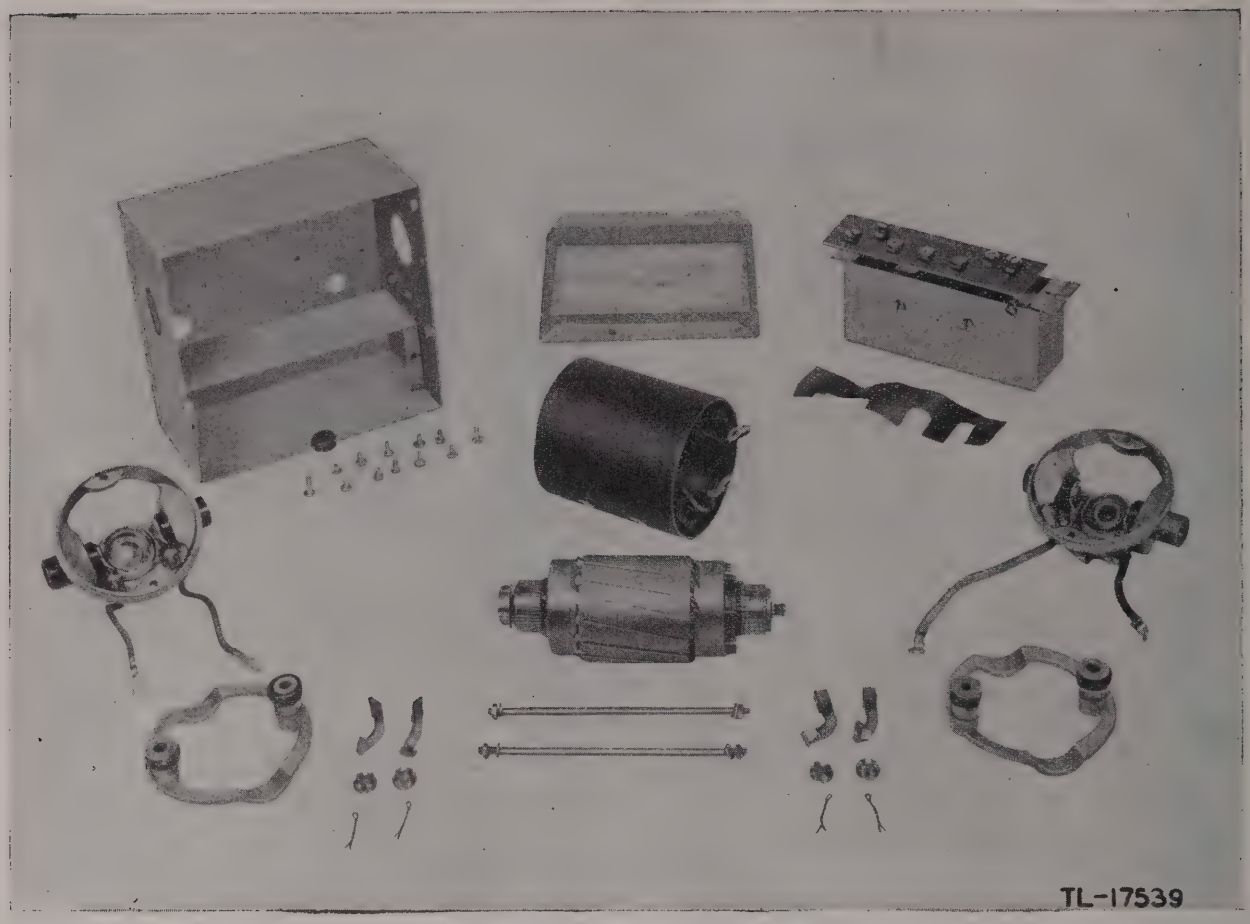


Figure. 6. Dynamotor parts.

Caution: Do not use carbon tetrachloride or emery cloth on commutator.

(11) Remove old, hardened lubricant from the bearings with a small brush and petroleum spirits and apply one drop of light lubricating oil. Work oil in by rotating the bearing.

Note. If commutator is badly worn or damaged or bearings are defective, replace complete dynamotor unit with a new unit.

c. Reassembly. (1) Insert the spacer shims in the bearing bracket and mount the bearing bracket on the low-voltage end of the stator assembly.

(2) Connect the wires to the brush holder.

(3) Insert the spacer shims in the bearing bracket, and slide the bearing on the high-voltage end of the armature into the high-voltage bearing bracket.

(4) Slide the armature into place through the stator assembly.

(5) Insert the tie bolts through the stator assembly and tighten the nuts.

(6) Connect the wires to the high-voltage brush holder.

(7) Check the end play in the armature (should be 0.005 to 0.015 in.).

(8) Pack the outer side of each bearing two-thirds full of Grease General Purpose No. 2 (WB), and replace the grease-retainer cap screw.

d. Replacement of Brushes. Before reinstalling brushes which have been used in a unit, examine each one for broken or loose pigtails, bent or burned springs, and excessive wear. Low-voltage brushes which are less than ⅜ inch long and high-voltage brushes which are less than 7/16 inch long or otherwise defective, should be replaced with new brushes. Run the dynamotor for at least 4 hours with a light load, to allow new brushes to seat properly.

e. Filter Pack (figs. 7 and 8). If the dynamotor output voltage is low, if no output is obtained, or if the dynamotor will not start when connected to Filter FL-6-(*), check chokes and capacitors for open or short circuits.

f. Reassembly in Housing and Final Testing. Reassemble the dynamotor in the housing and connect the leads to the filter pack connections. Test the dynamotor on available dynamotor test equip-

ment for output voltage, output current, ripple voltage, and input current. Do not remount the dynamotor in the receiver until the checks outlined in paragraph 14*a* below have been completed.

13. Rectifier Repair

a. General. The rectifier can be tested and repaired without removing it from the receiver. Remove the two screws from the top of the chassis (fig. 11). Turn the receiver chassis upside down and remove the screw pin from the inner mounting hinge. Swing the rectifier assembly away from the panel. Disconnect the B+ (red) lead from pin No. 7 of the group-6 terminal board in the receiver.

b. Resistance Check. Set the ON-OFF switch on the rectifier to ON. Turn the OFF-M.V.C.-A.V.C. control of the receiver to either M.V.C. or A.V.C. position, thus closing the input circuit of the rectifier (fig. 47). The resistance measured between the two prongs of socket SO2 on the rectifier

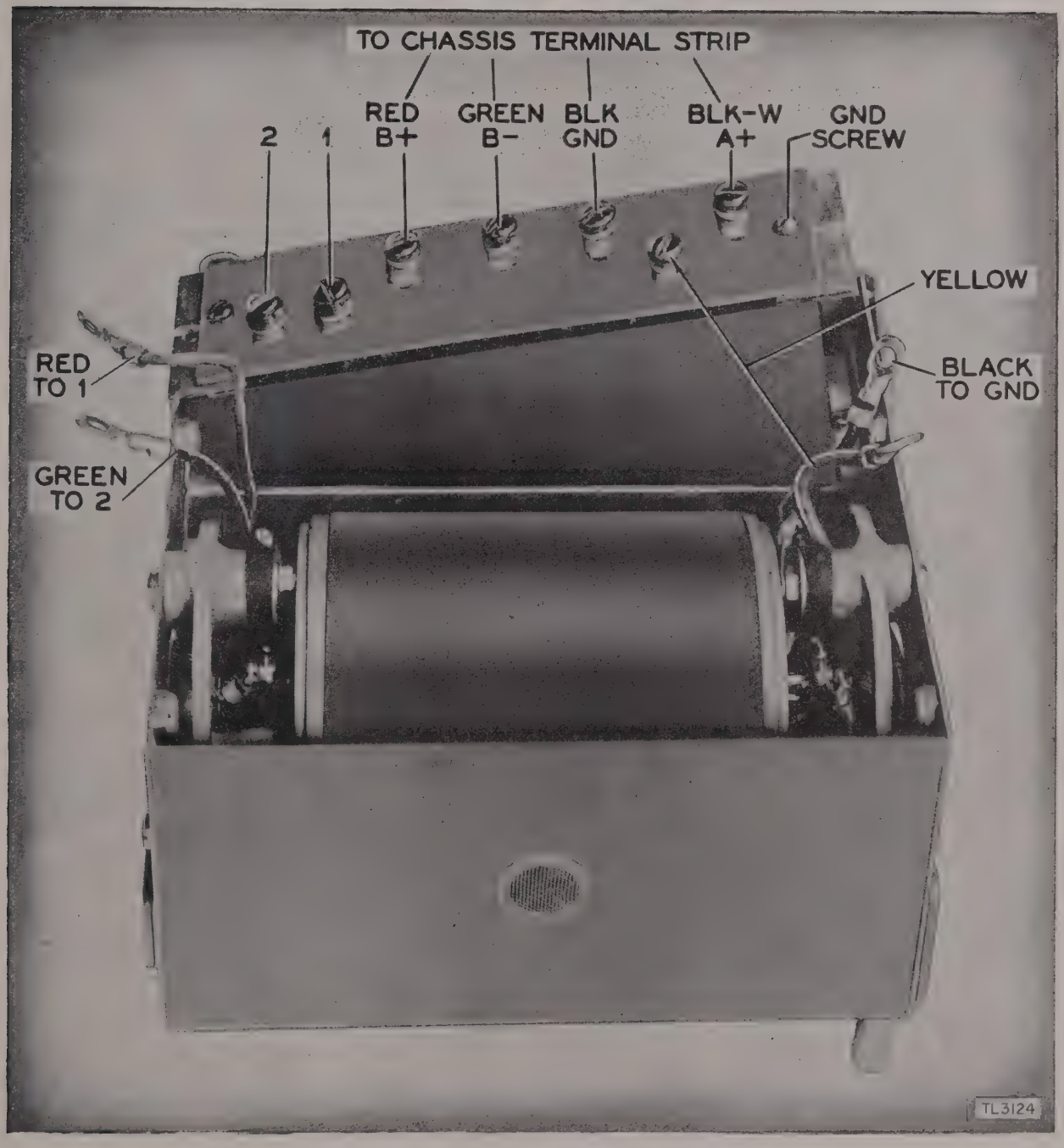


Figure 7. Filter FL-6-(*) and Dynamotor DM-21-(*).

Figure 8. Filter FL-6-(*), components.

should be approximately 3 ohms. If no reading is obtained, check fuse F3 in the rectifier, and the control and switch mentioned above. If the fuse and switches are not open, measure the resistance of the primary winding of transformer T3 between the terminals marked COMMON and 120 V on the rectifier terminal board. The reading should be approximately 3.6 ohms. No reading indicates an open primary winding or an open circuit in the wiring between the terminals and the winding. Make the same check between the COMMON and 110 V terminals. The reading should be approximately 3.4 ohms.

(1) When the input circuit has been found normal, check the output circuit. The resistance between the 250V. terminals should be approximately 65,000 ohms. A high resistance reading indicates an open bleeder resistor, R40; a low reading indicates a shorted filter capacitor, C89, C90, or choke L35 shorted to ground.

(2) With the OFF-M.V.C.-A.V.C. control in the receiver set at OFF, check the continuity of the filament and dial lamp windings of transformer T3 with an ohmmeter. Connect the ohmmeter across the terminals marked 12V. A-C for the dial lamp winding and across the terminals marked FILAMENT for the filament winding. Check the continuity of the rectifier filament winding with an ohmmeter connected across pins No. 2 and 8 of the rectifier tube socket with the tube removed.

c. Voltage Check. Check the high-voltage output of the rectifier, using a 16,500-ohm, 25-watt resistor as a dummy load across the 250V. terminals of the rectifier terminal board. The output should be approximately 260 volts. Check the filament and dial lamp voltages. Do not reconnect the B+ lead to the group-6 terminal board until the checks outlined in paragraph 14*b* below have been completed.

PRELIMINARY TROUBLE-SHOOTING PROCEDURES

14. Input Resistance Measurements

Trouble within the receiver may often be detected by checking the resistance of the filament and high-voltage circuits at the power input terminals before applying power to the equipment, thereby preventing damage to the power supply. Make the following checks before attempting to put the receiver in operation.

a. Radio Receivers BC-314-(*). Leaving the dynamotor disconnected and with all tubes and dial lamps removed, turn the BAND CHANGE switch to band A, the OFF-M.V.C.-A.V.C. control to M.V.C. or A.V.C., and set the C.W.-OSC. switch at ON while making these checks.

(1) The resistance between terminals D and T, the two large pins of socket SO1, should be infinite, except in receivers containing an oscillator compartment heater. In these receivers, the resistance reading should be 4 ohms. A resistance reading, in receivers which do not contain oscillator compartment heaters, indicates a short circuit in the filament or dial lamp wiring which must be corrected before power is applied to the receiver.

(2) The resistance between terminal No. 7 of the group-6 terminal board (fig. 12) in the receiver and chassis should be approximately 19,000 ohms (+10 percent). If the resistance is zero, check capacitors C10, C19, C50, C53, C56, C57, C63, C70, and the high-voltage wiring. If the resistance is low, check for a shorted bypass capacitor in one of the plate or screen grid circuits, a short in the wiring of one of the plate or screen-grid circuits, or leakage in one of the capacitors mentioned above. If the resistance is higher than normal, it indicates an open screen voltage dropping resistor. To prevent possible damage to the dynamotor, correct all abnormal conditions before applying high voltage to the receiver.

b. Radio Receiver BC-344-(*). Make sure that the B+ lead from the rectifier to terminal No. 7 of the group-6 terminal board is disconnected and all tubes are removed. Disconnect the rectifier filament leads from terminals No. 5 and 6 of the group-6 terminal board. Turn the BAND CHANGE switch to band A, and the OFF-M.V.C.-A.V.C. control to M.V.C. or A.V.C. Set the C.W.-OSC, switch at ON, and make the checks outlined in *a*(1) and (2) above. The checks and indications are identical for Radio Receivers BC-314-(*), and BC-344-(*).

15. Operating Test

a. Preparation. Insert all tubes in their proper sockets, making sure that they are fully seated. Connect the grid caps firmly. Replace the dial lamps. Make certain that terminal No. 8 of the group-6 terminal board is grounded to the chassis.

(1) In Radio Receivers BC-314-(*), replace the repaired dynamotor in the receiver and connect the dynamotor input and output leads (fig. 9). Apply the proper d-c (direct-current) voltage to terminals D and T of socket SO1.

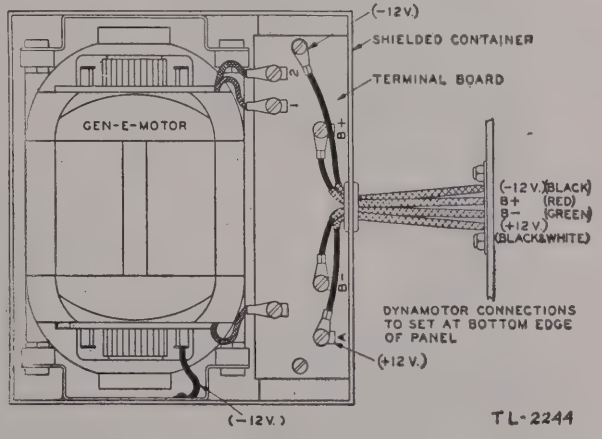


Figure 9. Dynamotor connections.

(2) In Radio Receiver BC-344-(*), reconnect the filament leads from the repaired rectifier to terminals No. 5 and 6 and the B+ lead to terminal No. 7 of the group-6 terminal board. Depending upon the voltage for which the rectifier is set, connect 110 or 120 volts ac to socket SO2.

b. Testing Radio Receivers BC-314-(*). (1) Turn the OFF-M.V.C.-A.V.C. control to M.V.C. or A.V.C.

(2) Listen for crackling or buzzing noises which indicate high-voltage arcing.

(3) Check the receiver for smoke, and the odor of burned or overheated parts.

(4) Make sure the operating temperature of the dynamotor is not too high. It should not be too hot to touch after it has been running for a long period of time.

(5) Measure the low-voltage input between terminals No. 1 and 6 of the group-6 terminal board. The voltage should be 12 to 14 volts dc in Radio Receiver BC-314-(*). If the voltage is abnormal, check the power source, filament and dial lamp wiring, and capacitors C61 and C62.

(6) The high voltage measured at terminals No 7 and 8 of the group-6 terminal board should be 220 to 240 volts direct current. If the voltage is zero or low, check the receiver for shorted wiring and shorted or leaky capacitors.

c. Testing Radio Receiver BC-344-(*). (1) Set the ON-OFF switch on the rectifier at ON.

(2) Turn the OFF-M.V.C.-A.V.C. control to M.V.C. or A.V.C.

(3) Listen for crackling or buzzing noises which indicate high-voltage arcing.

(4) Check the receiver for smoke and the odor of burned or overheated parts.

(5) The filament voltage measured between terminals No. 5 and 6 of the group-6 terminal board should be 12 volts alternating current. If the voltage is abnormal, check the filament wiring and capacitors C61 and C62.

(6) Check the dial lamp voltage for a reading of 12 volts ac between terminal No. 9 of the group-6 terminal board and ground. No voltage indicates an open circuit between the rectifier and the terminal board.

(7) The voltage measured between terminals No. 7 and 8 of the group-6 terminal board should be approximately 260 volts direct current. If the voltage is low, check for shorted wiring and shorted or leaky capacitors in the high-voltage circuits of the receiver.

ALIGNMENT PROCEDURE

16. Calibration of Test Equipment

To insure accuracy of alignment, use the frequency meter as a standard when setting the signal generator to a desired frequency. Check each signal generator setting against the frequency meter as follows: Place the signal generator and the frequency meter near each other. Turn both equipments on, and allow 15 minutes for them to warm up. Attach a piece of wire to the signal generator output connection; place the wire near the frequency meter antenna. Calibrate the frequency meter according to instructions furnished with the meter. Set the frequency meter at the exact frequency at which the signal generator is to be used. While listening with the headset attached to the frequency meter, tune the generator tuning control for zero beat. Turn the frequency meter off and remove the wire attached to the signal generator output connection.

17. I-f Alignment (par. 42*a*)

a. PREPARATION. Set up the receiver and alignment equipment (fig. 10). Calibrate the signal gen-

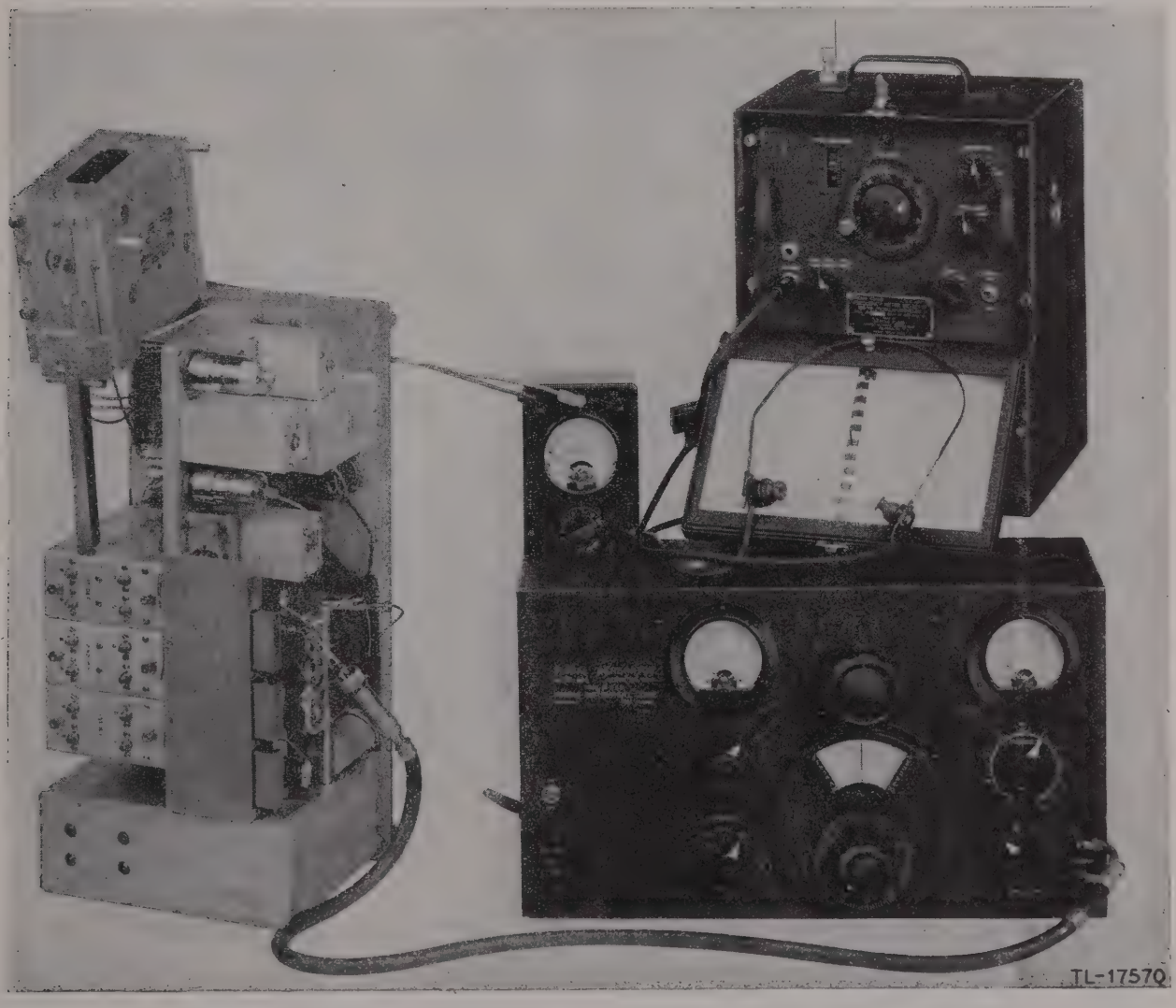


Figure 10. Radio Receiver BC-314-(*) or BC-344-(*), typical set-up for i-f alignment.

erator for a 92.5-kc signal (par. 16). Remove from the top of the chassis the two screws which hold the power supply stationary (fig. 11). Remove the screw from the dynamotor or rectifier inner mounting hinge and swing the power supply upward, securing it in position with a rack or block of wood. Set the OFF-M.V.C.-A.V.C. control at M.V.C., the SELECT control at maximum, the C.W.-OSC. switch at OFF, and the VOL control at maximum. Loosen the i-f transformer screw locknuts.

b. Procedure. (1) Attach the signal generator ground lead to the receiver chassis and connect the dummy antenna (300-ohm resistor) between the grid cap of the second i-f amplifier tube and the output lead from the signal generator.

(2) Connect the output meter to the PHONES 2ND AUDIO jack, and adjust the signal generator attenuator to give a small deflection on the lowest possible scale on the output meter.

(3) Adjust the second i-f transformer adjustment screws (figs. 11 and 12) located on the top and bottom of the transformer for maximum output indication.

(4) Reduce the signal generator output whenever necessary during alignment to avoid overloading the receiver.

(5) Move the dummy antenna to the grid cap of the first i-f amplifier tube; adjust the first i-f transformer adjustment screw for maximum output indication.

(6) Connect the dummy antenna to the grid cap of the first detector tube; adjust the first detector transformer adjustment screws for maximum output indication.

(7) Leaving the dummy antenna connected to the first detector tube, readjust the second i-f, first i-f, and first detector transformer adjustment screws, in the order named, for maximum output.

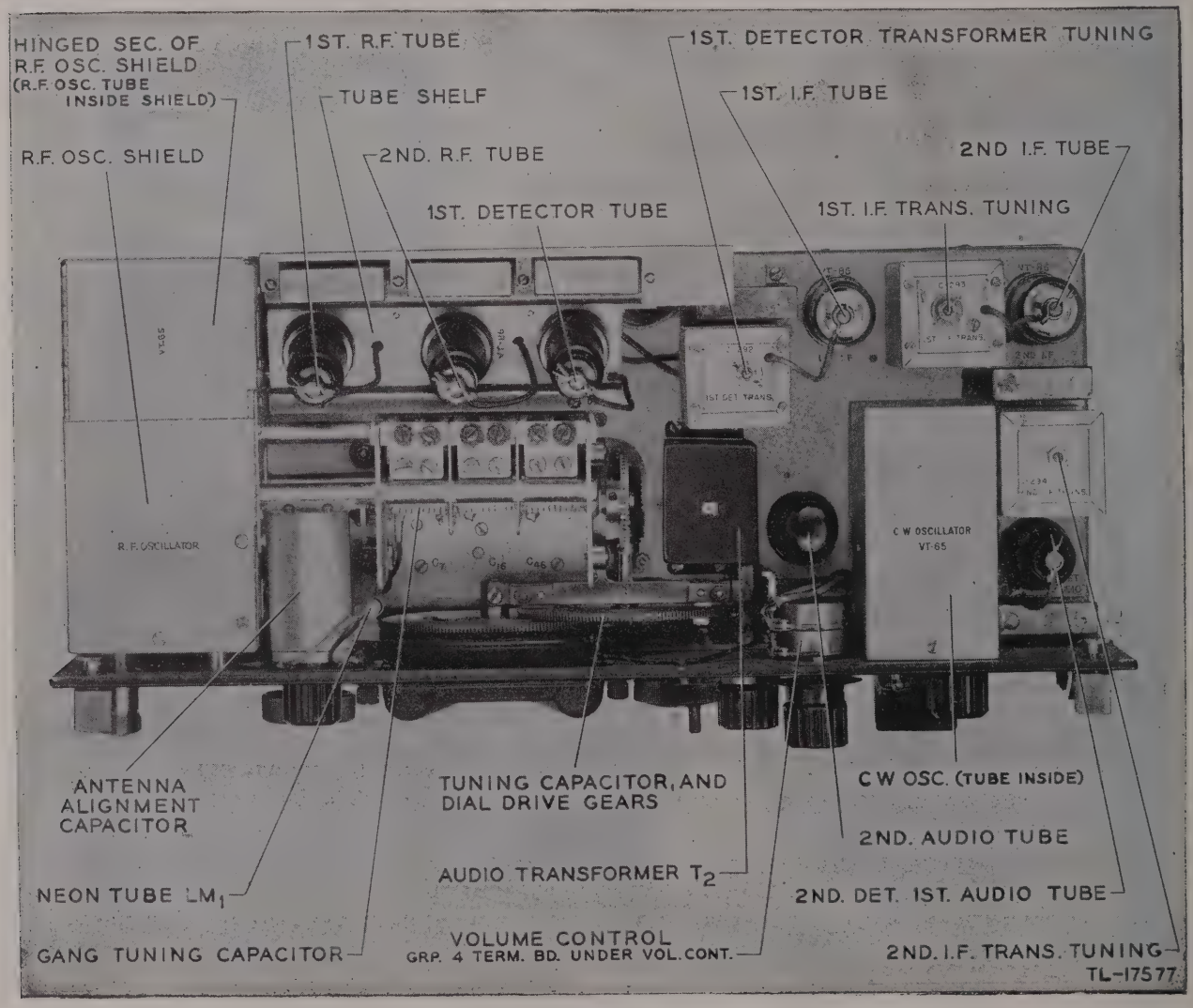


Figure 11. Receiver chassis, top view.

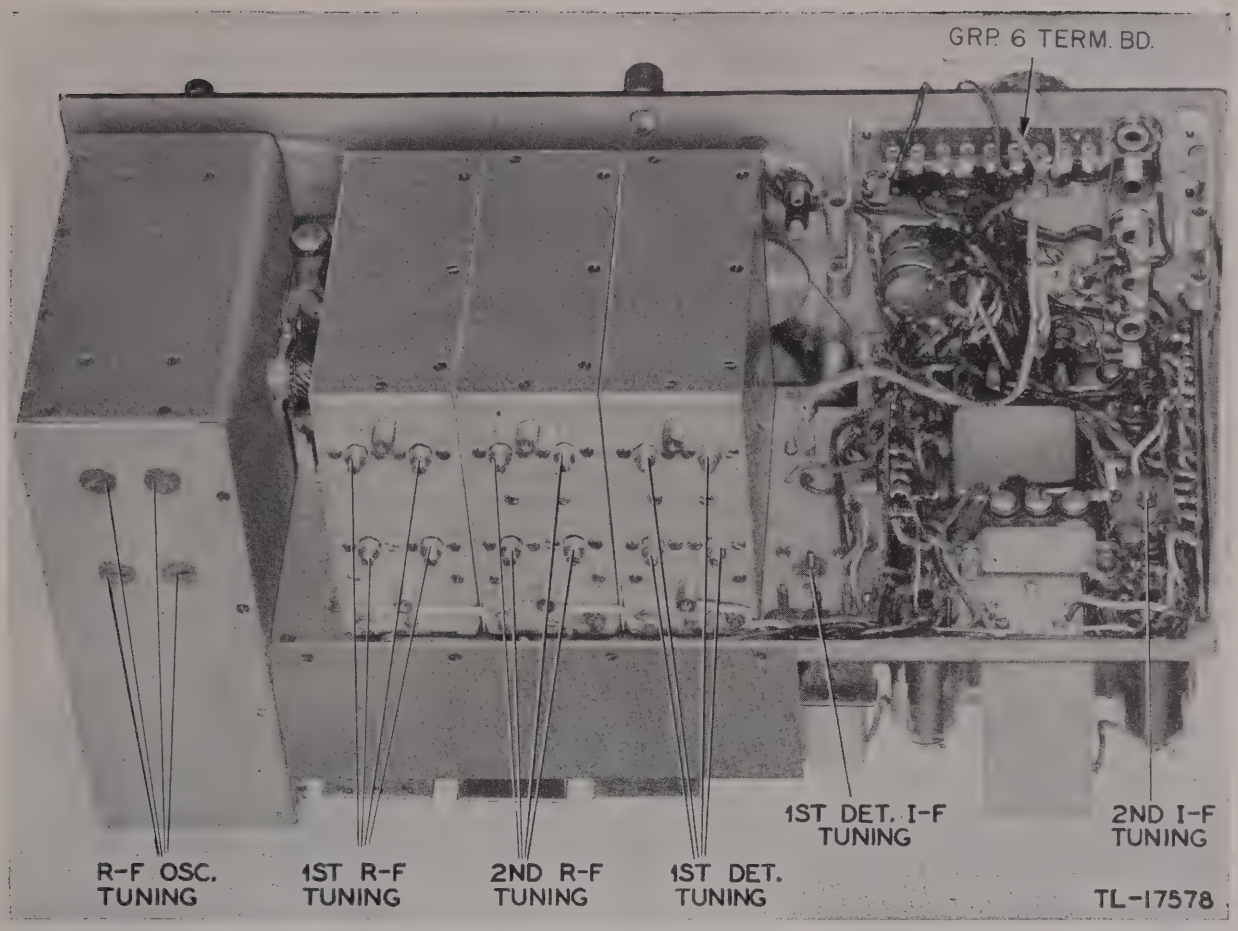


Figure 12. Receiver chassis, bottom view.

(8) Carefully tighten the adjustment screw locknuts, avoiding any change in the settings of the screws. A change in the deflection of the output meter while a locknut is being tightened indicates that the adjustment screw has been moved and must be readjusted.

18. I-f Alignment (Alternate Method)

Note. For further information refer to TM 11-310.

a. PREPARATION. Set up receiver and alignment equipment (fig. 10). Remove from the top of the chassis the two screws which hold the power supply stationary (fig. 11). Remove the screw from the dynamotor or rectifier inner mounting hinge and swing power supply upward, securing it in position with a rock or block of wood. Set the OFF-M.V.C.-A.V.C. control at M.V.C., the SELECT control at maximum, the C.W.-OSC. switch at OFF, and the VOL control at maximum. Loosen the i-f screw locknuts.

b. PROCEDURE. (1) Turn on the receiver and the frequency meter and allow 15 minutes for warming up.

(2) Set the receiver at any frequency on any band.

(3) Attach the headset to the frequency meter; insert the end of the frequency meter output lead into the r-f oscillator compartment of the receiver, so that it lies close to tuning capacitor.

(4) Tune the frequency meter to 92.5 kilocycles above the frequency at which the receiver dial is set; vary the frequency meter until zero beat is heard in the headset.

(5) When zero beat is heard, check the frequency at which the frequency meter is set. If the frequency is not 92.5 kilocycles more than the receiver dial setting, adjust the r-f oscillator adjusting screw for that particular band until zero beat is heard.

(6) Connect the signal generator lead through the 250-mmf capacitor to the receiver antenna post and connect the output meter to the PHONES 2ND AUDIO jack.

(7) Set the signal generator at the same frequency indicated by the receiver dial.

(8) Set the signal generator output for 400-cycle 30-percent modulation.

(9) Adjust each i-f adjustment screw for maximum output indication.

19. R-f Oscillator Alignment

a. General. Each r-f oscillator adjustment screw controls a small variable capacitor within the oscillator compartment. The rotor of each capacitor is adjustable over an arc of 360°. A red dot on one side of the screwdriver slot on each adjustment screw indicates the relative position of the rotor and stator of the variable capacitor. Capacitance is at a maximum (plates completely unmeshed) when dot is above the slot. The r-f oscillator operates 92.5 kc above the frequency of a received signal on all bands. The red dots on the adjustment screws should be above the center line on all bands when the r-f oscillator is properly aligned. The procedure outlined in the following paragraphs sets the r-f oscillator adjustments at the fundamental or proper frequency, rather than the image frequency.

b. Preparation. Set up the receiver and alignment equipment as shown in figure 13. Calibrate the signal generator for a 255-kc signal (par. 16). Set the receiver BAND CHANGE switch on band A (150 to 260 kc), the OFF-M.V.C.-A.V.C. control at M.V.C., the C.W.-OSC. switch at OFF, the SELECT control at maximum, the VOL control at maximum, and the receiver dial at 255 kc. Open the hinged cover of the r-f oscillator compartment; remove the screw caps which permit access to the r-f oscillator trimmer adjustment screws and loosen the screw locknuts.

c. Procedure. (1) Attach the signal generator ground lead to the receiver chassis and connect the 250-mmf (micromicrofarad) capacitor dummy antenna between the grid cap of the first detector tube and the output lead of the signal generator.

(2) Connect the output meter to the PHONES

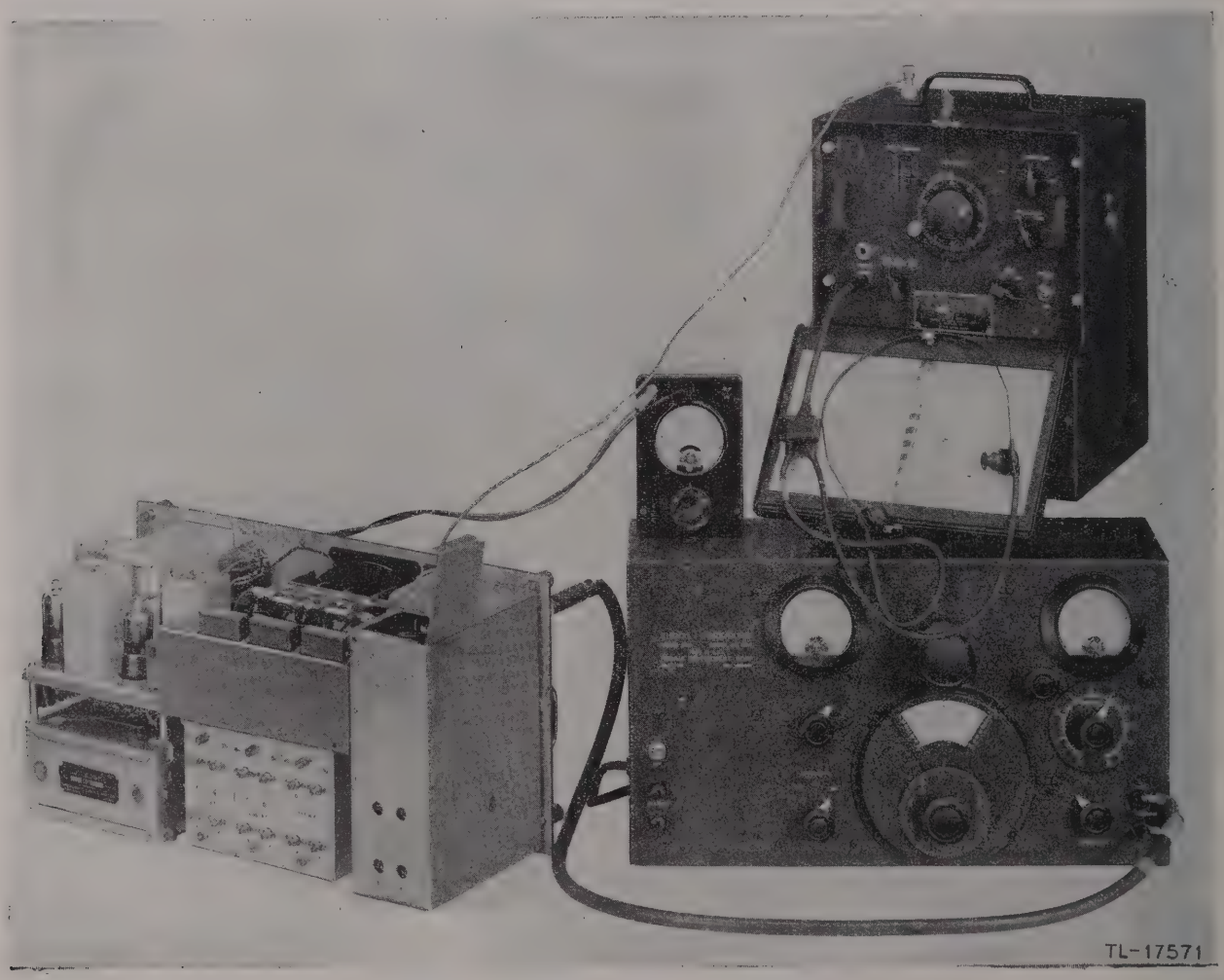


Figure 13. R-f oscillator alignment, tyipcal set-up.

2ND AUDIO jack and adjust the signal generator attenuator to give a small deflection on the lowest possible scale of the output meter.

(3) Connect a short length of insulated wire to the antenna connector of the frequency meter; insert the other end of the wire into the r-f oscillator compartment near the stator plates of the oscillator tuning capacitor. Calibrate the frequency meter for 347.5 kc.

(4) Listen to the frequency meter headset and adjust oscillator trimmer A for zero beat.

(5) Remove the wire from the oscillator compartment; close the hinged cover.

(6) Readjust trimmer A for maximum indication on the output meter, and tighten the locknut without disturbing the screw adjustment.

(7) Repeat the above procedure with each band trimmer, using the following signal generator, receiver dial, and frequency meter settings:

Band trimmer	Signal generator (kc)	Dial (kc)	Frequency meter (kc)
A	255	255	347.5
B	400	400	492.5
C	800	800	892.5
D	1,450	1,450	1,542.5

20. R - f and First Detector Alignment

a. GENERAL. The r-f and first detector adjustment screws, like those of the r-f oscillator, control similar small variable capacitors within the first and second r-f and the first detector compartments. The relative position of the rotor and stator of each capacitor is likewise indicated by a red dot.

b. PREPARATION. Set up the receiver and alignment equipment as shown in figure 14. Calibrate the signal generator for a 255-kc signal (par. 16). Set the receiver BAND CHANGE switch on band A, the OFF-M.V.C.-A.V.C. switch to M.V.C., the

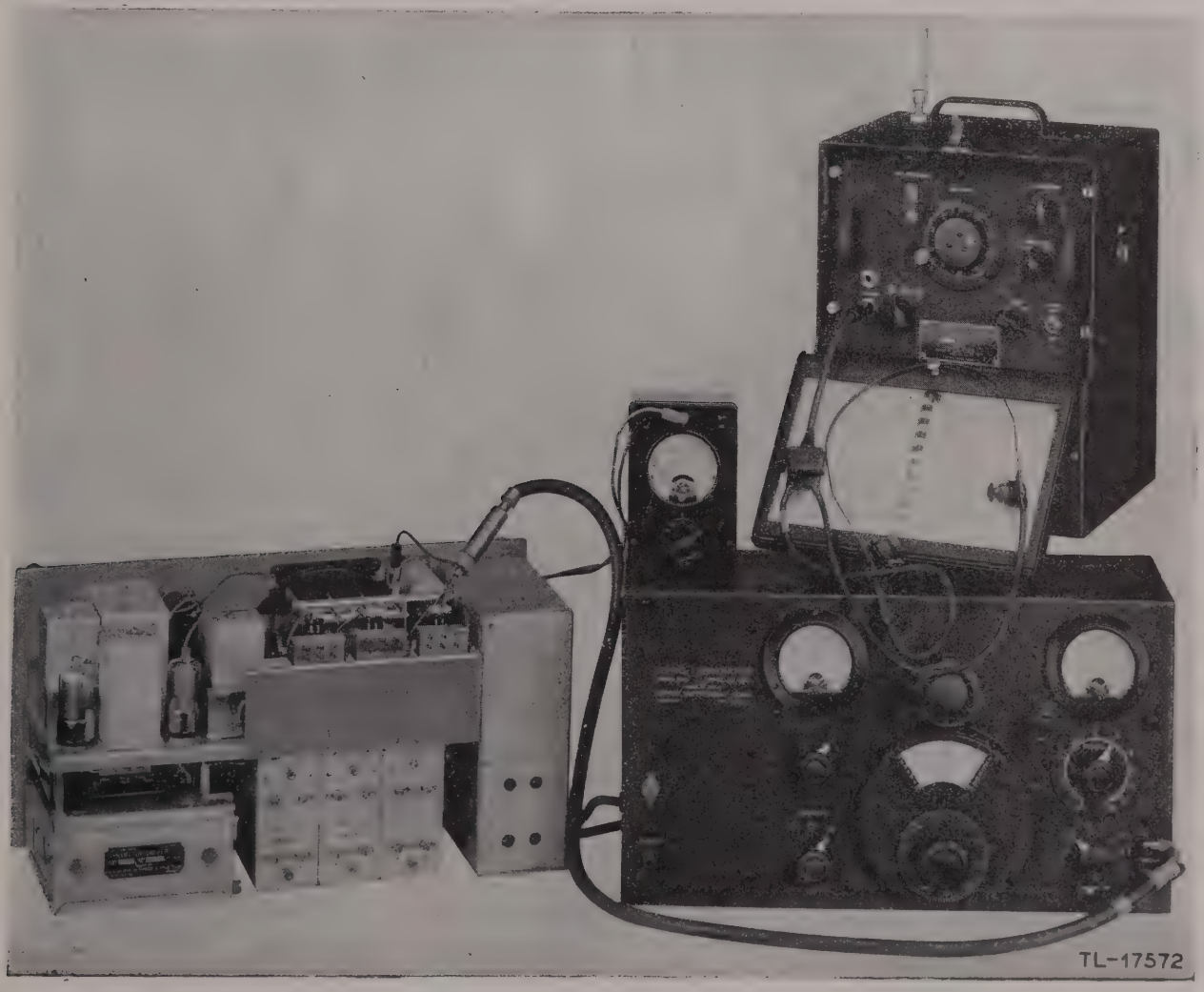


Figure 14. R-f alignment, typical set-up.

C.W.-OSC. switch to OFF, the VOL control to maximum, and the receiver dial to 255 kc. Remove the shield plate covering the r-f and first detector adjustment screws on the rear of the chassis; loosen the adjustment screw locknuts.

c. PROCEDURE. (1) Attach the signal generator ground lead to the receiver chassis and connect the dummy antenna (250-mmf capacitor) between the grid cap of the first detector tube and the output lead of the signal generator.

(2) Connect the output meter to the PHONES 2ND AUDIO jack and adjust the signal generator attenuator to give a small deflection on the lowest possible scale on the output meter.

(3) Adjust trimmer A of the first detector stage for maximum output reading on the output meter. Reduce output from the signal generator whenever necessary to avoid overloading the receiver.

(4) Move the dummy antenna to the grid cap of the second r-f stage and adjust second r-f trimmer A for maximum output.

(5) Connect the dummy antenna to the antenna connection on the receiver front panel and set the ALIGN INPUT control to midposition (arrow pointing straight up). Adjust first r-f trimmer A for maximum output.

(6) Tighten the locknuts on all of the A trimmer adjustment screws, avoiding any change of adjustment.

(7) Follow the same procedure and align each band, using the following trimmers and alignment frequencies:

Band trimmer	Alignment frequencies (kc)
A	255
B	440
C	800
D	1,450

(8) After aligning the receiver at the high-frequency end of each band, check the calibration at the low-frequency end. If the error is more than that specified in the dial deviation test (par. 36), adjust the inductance of the particular oscillator coil at fault. To make the adjustment, remove the oscillator unit and adjust the iron core inside the coil form. Moving the iron core into the coil increases the inductance, making the resonant frequency lower; moving the iron core out of the coil form decreases the inductance, making the resonant frequency higher.

21. C-w Oscillator Alignment

a. PREPARATION. Connect the equipment for i-f alignment. Calibrate the signal generator to 92.5 kc (par. 16). Set the OFF-M.V.C.-A.V.C. control at M.V.C. or A.V.C. and the C.W.-OSC. switch at ON. Turn the CW-OSC ADJUST control so that the arrow is horizontal, pointing to the right. Remove the cap screw above the C.W.-OSC. switch, permitting access to the c-w oscillator adjustment screw. Connect a headset or speaker to the receiver.

b. PROCEDURE. With the ground lead of the signal generator connected to the receiver chassis, feed an unmodulated 92.5-kc signal through a 300-ohm resistor to the control grid (grid cap) of the first detector tube. Adjust the c-w oscillator adjustment screw for zero signal response in the headset or speaker. Slowly turning the CW-OSC ADJUST control 90° counterclockwise or clockwise should now produce a beat note which gradually increases in pitch; rotating the control another 90° in the same direction should gradually decrease the pitch to zero signal when the arrow is again horizontal, but pointing to the left.

DETAILED TROUBLE-SHOOTING PROCEDURES

22. Localizing Trouble to Specific Stage

If the receiver is inoperative or has a weak output when aligned, the trouble can be quickly localized to a particular stage by signal substitution or signal tracing. Frequently an inoperative stage can be located by circuit disturbance. Turn the set on and, after the tubes have warmed up, touch a metallic object (such as a coin, key, or small screwdriver) to the control grid of each tube successively, beginning with the output tube and working forward to the input tube. If a click or hum is heard in the headset or speaker, the stage is generally operative. When no response is heard, the trouble lies between the point where the click was last heard and the point of no response.

23. Checking Audio Circuit (par. 48*a*)

a. Test and Indication. (1) Set the receiver OFF-M.V.C.-A.V.C. switch to A.V.C., the C.W.-OSC. switch at OFF, and the VOL control at maximum clockwise position (maximum volume).

(2) Connect a headset or speaker to the receiver.

(3) Connect the ground lead of the audio signal generator to the receiver chassis.

(4) Feed a signal from the audio signal generator through a 0.01-mf (microfarad) capacitor to the diode detector plate (pin No. 4 of the second detector tube). A loud, clear signal will be heard if the audio circuits are functioning properly.

(5) If a weak signal or no signal is heard, feed the signal from the audio signal generator to the output, then to the input of each of the audio stages, beginning with the last stage and continuing until the defective or inoperative stage is located.

b. Localization. If a stage is defective, refer to the paragraph covering the stage under test (sec. VIII). Trace the trouble to the defective part or parts by resistance and voltage checks.

24. Use of Stage Gain Charts

The stage gain charts list minimum and maximum input voltages required at each of the r-f and i-f stages of the receiver to produce a signal output of 10 milliwatts (equivalent to 6.3 volts across an output load of 4,000 ohms). These charts can be used as standards when trouble shooting to check the over-all gain of the receiver and the gain of each r-f or i-f stage or group of stages. When the receiver output is low, localize the defective stage by checking the signal-voltage level of each stage against the r-f and i-f stage gain charts, using either the signal substitution or signal tracing method of trouble shooting, or by measuring the individual stage gain.

a. R-f Stage Gain Chart.

Band	Frequency (kc)	Signal generator output connection: Antenna (ALIGN INPUT control set for maximum output). Signal generator output (microvolts) min	max	Control grid, first r-f stage. min	max	Control grid, second r-f stage. min	max	Control grid, first detector. min	max	Volume control setting	Output meter reading	Phantom antenna
A	155	3.0	7.0	40	50	135	145	340	360	(see note)	6.3	250-mmf capacitor and 1 megohm resistor in parallel.
B	265	3.0	6.0	40	50	165	175	290	310		6.3	
C	460	3.0	6.0	28	38	125	135	315	335		6.3	
D	850	3.2	6.0	26	36	155	165	325	345		6.3	

Note. Set the VOL control to maximum and adjust the signal generator output to produce a reading on the output meter. Turn off the modulation of the signal generator and turn the VOL control counterclockwise until the output meter reads 3.3 volts. *If the output meter reads 3.3 volts or less, with the VOL control at maximum and the modulation of the generator off, leave the VOL control set at maximum.* Turn the modulation of the signal generator on, and readjust the generator output to produce 6.3 volts on the output meter. Repeat this procedure until the output meter readings remain at 3.3 volts or less, and at 6.3 volts when the generator modulation control is repeatedly turned off and on.

b. I-F STAGE GAIN CHART.

Signal generator frequency (kc)	Signal generator output connection	Signal generator output (microvolts)		Volume control setting	Output meter reading (volts)	Phantom antenna
		Min	Max			
92.5	First detector control grid.	145	155	Maximum	6.3	350-ohm resistor.
	First i-f control grid.	540	560	Clockwise	6.3	
	Second i-f control grid.	11,000	13,000	position	6.3	

25. Signal Substitution

a. TEST AND INDICATION. (1) Set the receiver OFF-M.V.C.-A.V.C. control at M.V.C., and the C.W.-OSC. switch at OFF, the SELECT control at maximum, and the VOL control at the position indicated in the stage gain charts.

(2) Connect a 4,000-ohm, 1-watt (+5 percent) resistor across the 4,000-ohm secondary of transformer T2.

(3) Connect an a-c vacuum-tube voltmeter across the 4,000-ohm resistor. (An output meter with a 4,000-ohm input impedance may be used in place of the vacuum-tube voltmeter. If such a voltmeter is used, the 4,000-ohm resistor is not used.)

(4) Using a signal generator with a measured output (that is, a microvolter or equivalent), feed a signal of the correct frequency for the stage, with the voltage specified in the stage gain charts, to the control grid of each stage in succession. Begin with the grid of second i-f tube JAN-6K7 (VT-86) and work forward to the receiver input.

(5) If an output of 6.3 volts cannot be obtained when a signal voltage, which has a tolerance within the limits given in the r-f and i-f gain charts, is applied to the stage, that stage is defective.

b. LOCALIZATION. If the gain of a stage is abnormal, replace the tube and realign the stage. If the gain of that stage is still low, make a resistance and voltage check to locate the defective part. To trace the trouble to its origin, see the resistance and voltage charts and the paragraph covering the stage (sec. VIII).

26. Signal Tracing

Use a signal tracer, if available, to isolate a defective stage or to measure the relative stage gains of receiver r-f and i-f circuits.

a. TEST AND INDICATION. (1) Set the receiver OFF-M.V.C.-A.V.C. control at M.V.C., the C.W.-OSC. switch at OFF, the SELECT control at maximum, and the VOL control at the position indicated in the stage gain charts.

(2) Connect one end of the phantom antenna specified in the r-f stage gain chart to the receiver-antenna terminal.

(3) Connect the signal generator (microvolter) output lead to the other end of the phantom antenna, and connect the ground lead to the receiver chassis.

(4) Adjust the signal generator to supply a constant signal voltage of approximately the same value listed in the antenna column of the stage gain chart.

(5) Apply signal tracer in sequence to the grids of the various stages, starting with the grid of the first r-f amplifier. Each point should indicate an increase in signal strength over the previous one.

b. LOCALIZATION. When the gain of a stage is abnormal, follow the procedure outlined in paragraph 25*b* above to isolate the defective part.

27. Measuring Individual Stage Gain

Stage gain is conveniently measured by signal substitution. Apply the signal generator in sequence stage by stage, starting from the first r-f amplifier. If there is a deficiency in stage gain or improper operation of any stage, the value of the signal applied to attain an output reading of 6.3 volts will be excessive. To calculate the actual stage gain of a single stage, divide the value of the signal applied to its grid to produce 6.3 volts output, into the value of the signal necessary to produce the *same output voltage* when the signal is applied to the grid of the succeeding stage.

28. Checking C - w Oscillator Operation

a. TEST AND INDICATION. (1) Turn OFF-M.V.C.-A.V.C. control to M.V.C., the VOL control to its maximum clockwise position (maximum volume), the SELECT control to maximum, the C.W.-OSC. switch to ON, and the CW-OSC ADJUST control so the arrow is vertical. Connect a headset or speaker to the receiver.

(2) Feed an unmodulated 10mv (microvolt) signal (of the frequency at which the receiver dial is set) from the signal generator to the antenna terminal of the receiver.

(3) A high-pitched tone should be heard in the headset or speaker. As the CW-OSC ADJUST control is turned from a vertical position in either direction, the pitch of the tone should decrease in one direction and increase in the other direction until no signal is heard.

b. Localization. If no signal is heard at any setting of the CW-OSC ADJUST control, the stage is defective. Follow the procedure outlined in paragraph 25*b* above to isolate the defective part. If a signal is heard but the pitch of the tone increases as the CW-OSC ADJUST control is turned either clockwise or counterclockwise from the vertical position, the c-w oscillator is not aligned properly. Realign as directed in paragraph 21 above.

29. Voltage and Resistance Measurements

Figures 15, 16, and 17 supply correct voltage and resistance measurements made from the top of the chassis with an adapter and a 1,000-ohm-per-volt voltohmmeters. When no adapter is available, use a short length of insulated wire to make voltage measurements. Strip the insulation from one end of the wire and wrap the end around the pin of the tube under test. Insert the tube in its proper socket and measure the voltage at the other end of the wire. Avoid shorting the wire to the chassis. Measure the resistances by removing the tubes from their sockets. When measuring resistances on Radio Receiver BC-314-(*), disconnect the dynamotor leads from the dynamotor terminal board. When measuring resistances on Radio Receiver BC-344-(*), disconnect the blue, black and red wires leading from Rectifier RA-20 to terminals 5, 6, and 7 of the group-6 terminal board.

30. Moistureproofing, Fungiproofing, and Refinishing

After the receiver has been repaired and is functioning correctly, refer to TB SIG 13 and TB 11-850-1; moistureproof and fungiproof the equipment as instructed. If the receiver case has been scarred or chipped, remove any rough spots with #00 or #000 sandpaper and apply paint to spots with a small brush. If the case is sufficiently scarred and scratched to warrant complete refinishing, take the chassis from the case, remove all dirt and rust with solvent, dry cleaning kerosene, then spray entire case in accordance with Ordnance Specification TAC ES-No. 680.

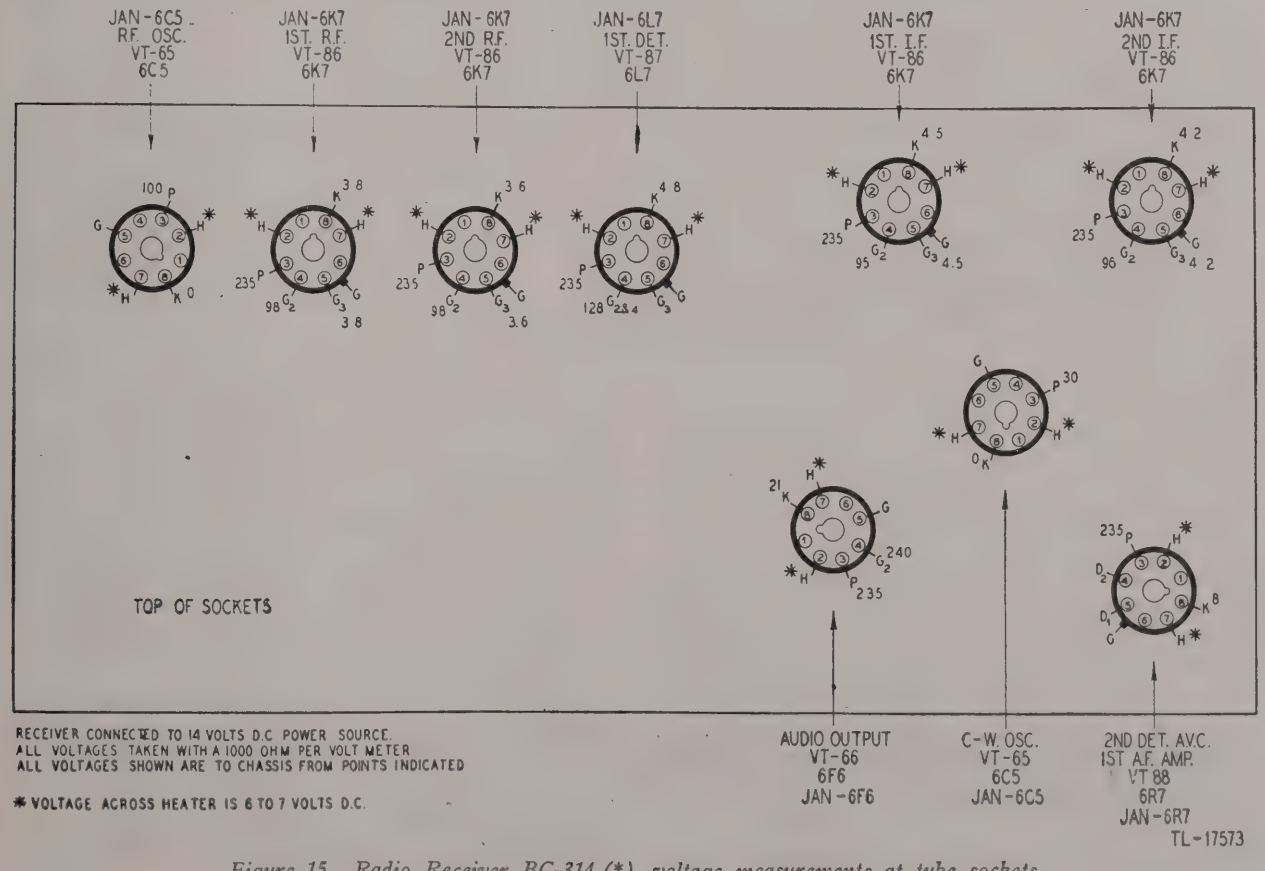


Figure 15. Radio Receiver BC-314-(*), voltage measurements at tube sockets.

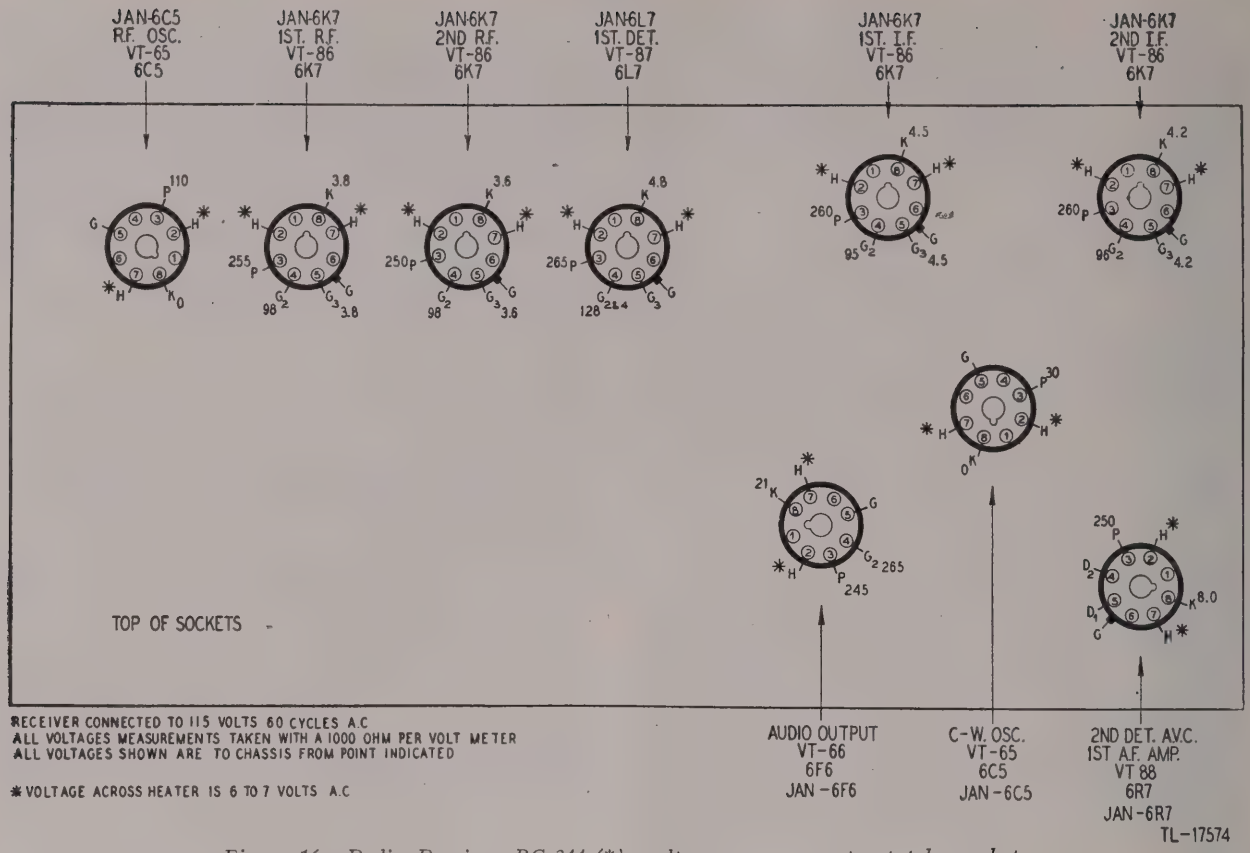


Figure 16. Radio Receiver BC-344-(*), voltage measurements at tube sockets.

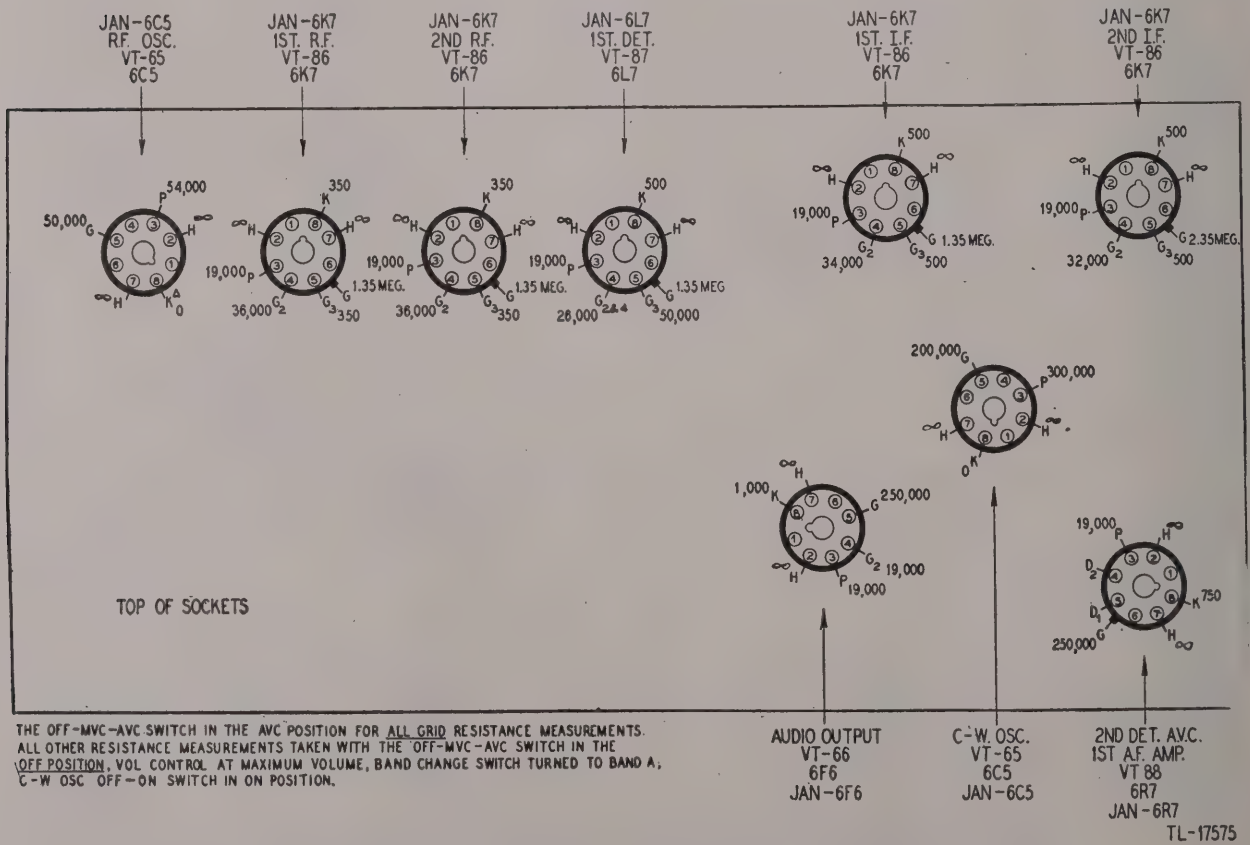


Figure 17. Radio Receivers BC-314-(*) and BC-344-(*), resistance measurements at tube sockets.

FINAL TESTING

31. Alignment Check (par. 48*a*)

After repairs have been completed on the receiver and the unit has been moistureproofed and fungiproofed, a final test must be made to ascertain that the unit is in proper condition for tactical use. Although the unit was correctly aligned during the repair procedure, recheck the alignment (pars. 17 to 21) after moistureproofing and fungiproofing the equipment. After the completion of the alignment check, make at least the signal-to-noise ratio test, the m-c-w (modulated-continuous-wave) sensitivity test on M.V.C. and the operational test; also make any of the following over-all performance tests which may be needed.

a. Signal-to-noise ratio test (par. 32).

b. M-c-w sensitivity test on M.V.C. and A.V.C. (par. 33).

c. C-w sensitivity test on M.V.C. and A.V.C. (par. 34).

d. Over-all selectivity test on M.V.C. and A.V.C. (par. 35).

e. Dial deviation test (par. 36).

f. Output overload test (par. 37).

g. Operational test (par. 38).

32. Signal-to-noise Ratio Test

a. GENERAL. All final tests of the receiver are based upon a signal-to-noise ratio of 4 to 1. This ratio is established as follows:

b. PREPARATION. (1) Set up the receiver and test equipment as shown in figure 18.

(2) Connect one lead of a 250-mmf capacity to the receiver antenna terminal and the other lead to the output lead of the signal generator.

(3) Connect the signal generator ground lead to the receiver chassis.

(4) Connect the output meter to the SPEAKER 2ND AUDIO jack. If a vacuum-tube voltmeter is used, place a 4,000-ohm noninductive resistor across the output of transformer T2; measure the output across the resistor.

(5) Turn the receiver VOL control to maximum, the OFF-M.V.C.-A.V.C. control to M.V.C., the SELECT control to maximum, and the C.W-OSC. switch to OFF.

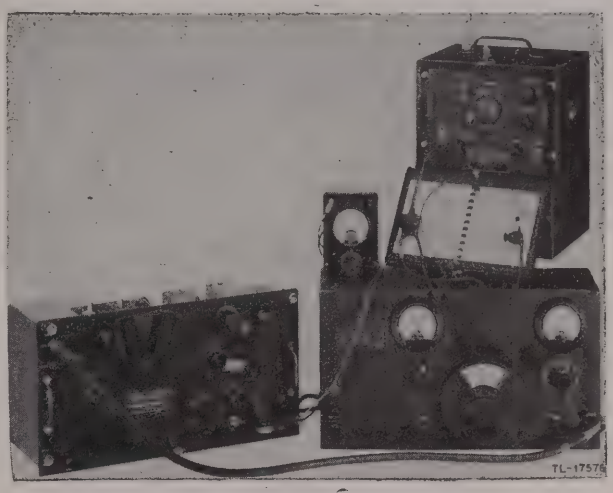


Figure 18. Final testing, typical set-up.

(6) Set the signal generator for 30-percent modulation at 400 cycles.

(7) Tune the signal generator and receiver to 150 kc.

(8) Set the ALIGN INPUT control for maximum indication on output meter.

(9) Set the signal generator output attenuator to produce a reading on the output meter.

(10) Turn off the modulation of the signal generator.

(11) Turn the VOL control counterclockwise until the output meter reads 3.3 volts. Should the output meter read 3.3 volts or less, leave the VOL control at maximum.

(12) Turn the modulation of the signal generator on and readjust the generator output to produce 6.3 volts on output meter.

(13) Repeat steps (10), (11), and (12) until the output meter reads 3.3 volts and 6.3 volts when modulation is repeatedly turned off and on.

(14) The output meter readings of 6.3 volts and 3.3 volts represent a power ratio of 4 to 1.

33. M - c - w Sensitivity Test

a. PREPARATION. Establish the signal-to-noise ratio (par. 32).

b. TEST. (1) The m-c-w sensitivity of the receiver at 150 kc is the signal generator output in microvolts required to produce the 6.3-volt reading referred to in step (12), paragraph 32, and should be within the limits shown in the m-c-w sensitivity chart (see *c* below).

(2) Repeat steps (8) to (13) paragraph 32 for each check point frequency shown in the m-c-w sensitivity chart, and check the generator output against the limits given in the chart.

(3) When the tests have been completed for all check points, turn the OFF-M.V.C.-A.V.C. control to A.V.C. and repeat the above procedure. The sensitivity on A.V.C. should also fall within the limits given in the chart.

c. M-C-W SENSITIVITY CHART.

Band	Frequency (kc)	Signal generator output*		Output meter reading
		Normal	Maximum	
A	150	3.0	7.0	6.3
	260	2.0	5.0	6.3
B	260	3.0	6.0	6.3
	450	1.25	4.0	6.3
C	450	3.0	6.0	6.3
	820	2.0	4.0	6.3
D	820	3.2	6.0	6.3
	1,500	2.0	4.0	6.3

* Signal generator output necessary to produce output meter reading shown.

34. C-w Sensitivity Test

a. PREPARATION. (1) Follow the procedure given in steps (1) through (6) paragraph 32.

(2) Tune the signal generator and the receiver to the first check frequency (150 kc) given in the c-w sensitivity chart (*c* below).

(3) Set the ALIGN INPUT control for maximum indication on the output meter.

(4) Turn the signal generator modulation off.

(5) Set the C.W-OSC. switch at ON.

b. TEST. (1) Vary the setting of the CW-ADJUST control to produce peak reading on the output meter.

(2) Turn the generator band change switch to the band above or below the band on which it was previously set. Do not change the calibration.

(3) Adjust the VOL control to produce a reading of 3.3 volts on the output meter. This is the noise level for the test.

(4) Return the generator BAND CHANGE switch to the original setting (calibrated at 150 kc).

(5) Adjust the generator attenuation control to produce a 6.3-volt reading on the output meter.

(6) Repeat steps (2) through (5) above until the output meter reads 3.3 and 6.3 volts when steps (2) and (4) above are repeated several times. Do not change the VOL or attenuation control settings to secure these readings.

(7) The c-w sensitivity of the receiver at 150 kc is the signal generator output in microvolts required to produce the 6.3-volt reading referred to in step (6) above. The sensitivity should be within the limits given in the c-w sensitivity chart.

(8) Repeat the above procedure at each check frequency given in the chart.

(9) Turn the OFF-M.V.C.-A.V.C. control to A.V.C. and repeat the test for all check frequencies. The sensitivity should remain within the limits given in the chart.

c. C-W SENSITIVITY CHART.

Band	Frequency	Signal generator output*		Output meter reading
		Normal	Maximum	
A	150	1.0	3.0	6.3
	260			
B	260	1.0	3.0	6.3
	450			
C	450	1.0	3.0	6.3
	820			
D	820	1.0	3.0	6.3
	1,500			

* Signal generator output which should produce output meter reading shown.

35. Selectivity Test

a. PREPARATION. Establish the signal-to-noise ratio (par. 32) at the first check frequency (200 kc) designated in the over-all selectivity chart (*c* below).

b. TEST. (1) Increase the output of the signal generator to ten times the output in microvolts required to produce the 6.3-volt reading obtained when establishing the signal-to-noise ratio in *a* above.

(2) Retune the generator to the frequency above the check frequency which produces an output of 6.3 volts.

(3) Retune the generator to the frequency below the check frequency which produces an output of 6.3 volts.

(4) The difference between the two frequencies obtained in steps (2) and (3) above constitute the over-all bandwidth at the check frequency. The two frequencies must fall within the limits given in the m-c-w selectivity chart.

(5) Repeat the test for each check frequency given in the chart.

c. Over-all Selectivity Chart.

Band	Check point frequency (kc)	Signal generator frequency settings*		
		Normal band width (kc)	Minimum band width (kc)	Maximum band width (kc)
A	200	195.8-204.2	196.5-203.5	193.5-207.5
B	360	355.1-364.9	356.5-363.5	352.5-367.5
C	600	594.5-605.5	596-604	590-610
D	1,200	1193.2-1206.8	1195-1205	1195-1205

* Signal generator frequency settings above and below check point frequencies which should produce an output meter reading of 6.3 volts.

36. Dial Deviation Test

a. Preparation. Leave the equipment set up as directed in paragraph 35*a* (1).

b. Test. (1) Tune the receiver dial accurately to the first check point frequency shown in the dial deviation chart (*c* below).

(2) Tune the signal generator to the point where maximum output meter reading is obtained.

(3) Check the frequency reading of the signal generator, which should be within the limits shown in the chart.

(4) Repeat steps (1), (2), and (3) above at each check point frequency shown in the chart.

c. Dial Deviation Chart.

Band	Check point frequency (kc)	Deviation limits* (kc)
A	150	10
	200	10
	260	10
B	260	10
	360	10
	450	10
C	450	10
	600	10
	820	10
D	820	10
	1,200	10
	1,500	10

* Deviation limits above and below check point frequency.

37. Output Overload Test

a. Preparation. Follow the procedure given in steps (1) through (8) paragraph 32.

b. Test. (1) Beginning with an input of 0 microvolts from the signal generator, increase the input from the generator until the first peak output indication is produced on the output meter. An approximately 18-microvolt input is required to give an output reading of approximately 64 volts.

(2) Turn the OFF-M.V.C.-A.V.C. control to A.V.C.

(3) Increase the generator output until a new peak reading is obtained on the output meter. A 150-microvolt input is required to produce an output of approximately 68 volts.

Note. The peak reading obtained in the A.V.C. position must not differ materially from that obtained in the M.V.C. position if the a-v-c circuit is functioning properly.

38. Operational Test

After completion of all preceding tests, give the receiver a final operational test. Place the receiver in its cabinet, fasten the screw locks, and connect one of the various types of antennas used with the receiver in the field. Check the performance of the receiver in all modes of operation on each band, using either headset or loudspeaker.

INDIVIDUAL STAGE AND CIRCUIT REPAIR DATA

39. Antenna Circuit

a. Special Circuit Features. The receiver antenna circuit is a conventional multiband tuned-input circuit for the first r-f amplifier stage. It incorporates a neon lamp to protect the tuning coils against overload which might be placed on the antenna. An antenna grounding relay, used in late models, also disables the audio circuit, and operates in conjunction with the transmitter which is used with the receiver.

b. Parts Data.

Reference symbol	Signal Corps stock No.	Name of part and description	Function
C1	3D293	CAPACITOR, variable: air; 7-plate; 10 to 210-mmf.	Antenna align capacitor.
C2	3D290	CAPACITOR, variable: air; 14-plate; 4 to 50-mmf; (part of first r-f unit assembly).	Band D, first r-f trimmer.
C3	3D290	CAPACITOR, variable: same as C2.	Band C, first r-f trimmer.
C4	3D290	CAPACITOR, variable: same as C2.	Band B, first r-f trimmer.
C5	3D290	CAPACITOR, variable: same as C2.	Band A, first r-f trimmer.
C6	3D277	CAPACITOR, fixed: paper; 0.1-mf ±10%; 400 vdcw.	Combines with R5 to form first r-f a-v-c filter.
C7	3D340	CAPACITOR, variable: air; 13- to 256-mmf; (part of tuning capacitor).	Tuner, first r-f grid circuit.
L1	3C1083A-3	COIL: (part of first r-f unit assembly).	Band D, first r-f transformer.
L2	3C1083A-2	COIL: (part of first r-f unit assembly).	Band C, first r-f transformer.
L3	3C1083A-1	COIL: (part of first r-f unit assembly).	Band B, first r-f transformer.
L4	3C1083A	COIL: (part of first r-f unit assembly).	Band A, first r-f transformer.
LM1	2Z5893	LAMP, neon: assembly.	Antenna overload protection.
R5	3Z4550	RESISTOR, fixed: Composition; 100,000-ohm, ±10%; ⅓ w.	Part of a-v-c filter; (see C6).
RL1	2Z7613	RELAY, DPST: 12- to 14-volt coil.	Send-receive relay.
SW2	3Z8310-2	SWITCH, single rotor: 4-position; ceramic section; (part of first r-f assembly).	Band change; selects proper antenna tap on first r-f coils.
SW3	3Z8310-2	SWITCH: same as SW2.	Band change, selects proper grid tap on first r-f coil.
	2C4314G/A4	FIRST R-F UNIT ASSEMBLY: consists of capacitors C2 to C6; resistors R5; coils L1 to L4; switches SW2 and SW3; terminal board; mounted in aluminum box; (used in BC-314-G and BC-344-D).	
	2C4314F.1/A1	FIRST R-F UNIT ASSEMBLY: Same as above; (used in BC-314-C, -D, -E, and -F).	

c. Removal and Adjustment of Antenna Relay. (1) Unsolder the connecting leads from antenna alignment capacitor C1, and tag each lead.

(2) Detach the antenna alignment capacitor and remove it from the front panel.

(3) Remove neon lamp LM1 from its clip.

(4) Remove the relay cover by pulling it outward, then up. The relay cover clips to the relay base and requires a little pressure to remove.

(5) When the cover has been removed, readjust or replace the relay, as required.

(*a*) Adjust the contact clearance of Relay BK-13 by loosening the locknut on the adjusting screw on top of the relay armature. With a 1/32 inch gauge

between the contacts, turn the adjusting screw until gauge fits snugly between the contact points without bending the contact springs. When the contacts are properly adjusted, there should be between $\frac{1}{64}$-inch and $\frac{1}{32}$-inch space between the armature and the pole piece when the contacts are just closed. This allows for a slight wiping action between the contacts as the armature is pulled against the pole piece when the relay is energized.

(*b*) Replace the entire relay if the contacts or contact springs are damaged or if the coil is defective.

d. Removal of r-f Tube Shelf. (1) Remove the backplate of the tube shelf (eight screws).

(2) Remove the grid leads from the grid caps of the first r-f, second r-f, and first detector tubes.

(3) Remove two stud screws and two machine screws from the shelf base.

(4) Lift the shelf up and swing outward for repairs, measurements, or removal of units mounted beneath it.

(5) If it becomes necessary to remove the shelf from the chassis, unsolder the 16 leads connected to the components mounted on the shelf. Tag each lead.

e. Removal of First r-f Unit Assembly. (1) Rotate the BAND CHANGE switch to band A.

(2) Remove the setscrew from the band switch shaft coupling located between the first r-f and r-f oscillator unit assemblies on the under side of the chassis.

(3) Remove the screw plug from the oscillator compartment shield and, using a pair of long-nose pliers, remove the band switch shaft.

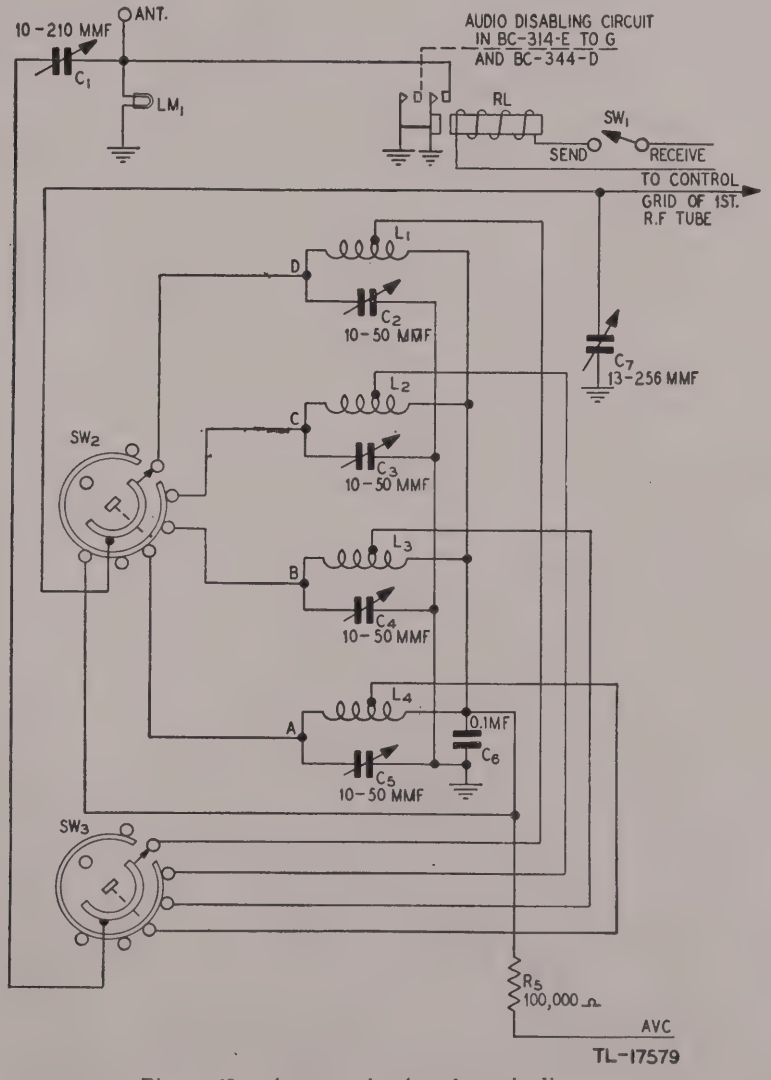


Figure 19. Antenna circuit, schematic diagram.

(4) Remove the r-f tube shelf (*d* above).

(5) Remove the backplate covering the alignment screws on the first and second r-f and first detector unit assemblies.

(6) Unsolder all the wires from the top and rear of the first r-f unit. Four wires are attached to connectors which protrude through the top of the chassis: one wire connects to the antenna ALIGN INPUT control, one to the variable gang capacitor, one to the grid of the first r-f tube, and one to the chassis. There is also one connector on the rear of the unit, with a wire connecting to the a-v-c bus. Tag all wires before removing them.

(7) Remove four flathead screws from the top of the chassis above the unit, lift out the unit.

40. First R-f Amplifier

a. Special Circuit Features. The receiver first r-f amplifier is conventional. For data on the a-v-c and cathode bias circuits, see paragraph 50. Refer to the receiver schematic diagram (fig. 47) to check the B+ bus.

b. Voltage and Resistance Measurements. The voltage and resistance measurements shown in figure 20 were made from the top of the tube socket between the points indicated and the chassis. The voltage measurements are made with the tubes plugged into an adapter similar to that supplied with some models of Test Set I-56. When no adapter is available, strip the ends of a short piece of insulated wire. Wrap one end of the wire around the tube pin at which measurements are to be made and plug the tube into its socket. Connect the meter between the other end of the wire and the chassis to obtain these readings. Resistance readings are taken with the tubes removed from the sockets. Do not ground the wire to the chassis. Make the tests under the following conditions:

(1) *Voltage measurements.* (*a*) Use a 1,000-ohm-per-volt voltmeter.

(*b*) Connect the receiver under test to the proper input voltage.

(*c*) Set OFF-M.V.C.-A.V.C. control at M.V.C. position.

(*d*) Turn C.W.-OSC. switch to ON.

(*e*) Turn VOL control to maximum (clockwise).

Note. The voltage measurements given are not critical, and considerable variation may be encountered in different receivers. Socket voltages will vary depending upon input voltages. However, if voltages vary greatly from those listed, trouble is indicated and the components in the circuit under test should be given a resistance check to isolate the defective part.

(2) *Resistance measurements.* (a) Disconnect input voltage from the receiver.

(*b*) Set the OFF-M.V.C.-A.V.C. control at OFF.

(*c*) Set the VOL control at maximum.

(*d*) Set the C.W.-OSC. switch at ON.

(*e*) Turn the BAND CHANGE switch to band A.

(*f*) On Receiver BC-314-(*), disconnect the dynamotor leads from the dynamotor terminal board.

(*g*) On Radio Receiver BC-344-(*), unsolder the blue, black, and red wires leading from Rectifier RA-20 to terminals No. 5, 6, and 7 of the group-6 terminal board.

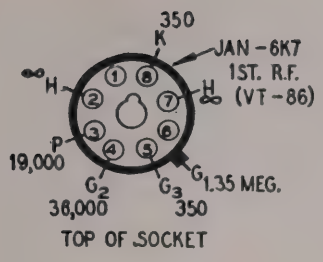
c. PARTS DATA.

Reference symbol	Signal Corps stock No.	Name of part and description	Function
	3D255	CAPACITOR, fixed: paper; 3-section; each 0.1-mf, +14% —6%; 400 vdcw.	
C8	3D255	CAPACITOR, fixed: one section of preceding item.	First r-f cathode bypass.
C9	3D255	CAPACITOR, fixed: same as C8.	Firt r-f screen bypass.
C10	3D255	CAPACITOR, fixed: same as C8.	First r-f B+ bypass.
C11	3D290	CAPACITOR, variable: air; 14-plate; 4- to 50-mmf.	Band C, second r-f trimmer.
C12	3D290	CAPACITOR, variable: same as C11.	Band B, second r-f trimmer.
C13	3D290	CAPACITOR, variable: same as C11.	Band A, second r-f trimmer.
C14	3D290	CAPACITOR, variable: same as C11.	Band D, second r-f trimmer.
C15	3D277	CAPACITOR, fixed: paper; 0.1 mf, ±10%; 400 vdcw.	Combines with R7 to form an a-v-c filter for first r-f stage.
C16	3D340	CAPACITOR, variable: air; 13- to 256-mmf; (part of gang tuning capacitor).	Tunes second r-f grid circuit.
C76	3D277	CAPACITOR, fixed: same as C15.	Combines with R6 to form a B+ filter to prevent interstage coupling.
C77	3D241	CAPACITOR, fixed: silver mica; 25 mmf, ±2%; 400 vdcw.	Tunes band B, first r-f coil.
C83	3D241	CAPACITOR, fixed: same as C77.	Tunes band A, second r-f coil.
C85	3D241	CAPACITOR, fixed: same as C77.	Tunes band D, second r-f coil.
L5, L6	3C1083A-7	COIL: (part of second r-f unit assembly).	Band D, second r-f transformer.
L7, L8	3C1083A-6	COIL: (part of second r-f unit assembly).	Band C, second r-f transformer.
L9, L10	3C1083A-5	COIL: (part of second r-f unit assembly).	Band B, second r-f transformer.
L11, L12	3C1083A-4	COIL: (part of second r-f unit assembly).	Band A, second r-f transformer.
R2	3Z4566	RESISTOR, fixed: wire-wound; 350-ohm, ±10%; 1 w.	First r-f cathode resistor.
R3	3Z4541	RESISTOR, fixed: composition; 75,000-ohm, ±10%; ½ w.	First r-f screen bleeder.
R4	3Z4549	RESISTOR, fixed: composition; 40,000-ohm, ±10%; ½ w.	First r-f screen resistor.
R6	3Z4550	RESISTOR, fixed: composition; 1,000-ohm, ±10%; ½ w.	Part of B+ filter (see C76).
R7	3Z4550	RESISTOR, fixed: composition; 100,000-ohm, ±10%; ½ w.	Part of a-v-c filter (see C15).
SW4	3Z8310-2	SWITCH, single rotor; 4-position; ceramic section; (part of first r-f unit assembly).	Band change; selects proper grid windings of first r-f coils.
SW5	3Z8310-2	SWITCH: Same as SW4.	Band change; selects proper plate windings of first r-f coils.
	2C4134F.1/A2	SECOND R-F UNIT ASSEMBLY: consisting of capacitors C11, C15, C37, C76, and C85; coils L5 to L12; resistor R7; switches SW4 and SW5; terminal boards; mounted in aluminum box; (used in BC-314-C, -D, -E, and -F).	
	2C4314G/A3	SECOND R-F UNIT ASSEMBLY: same as above; (used in BC-314-G and BC-344-D).	

d. REMOVAL OF SECOND R-F UNIT ASSEMBLY. (1) Follow the procedure outlined in paragraph 39*e*, (1) through (5).

(2) Unsolder all wires from the top and rear of the unit. Four wires are attached to connectors which protrude through the top of the chassis: one wire connects to the variable gang capacitor, one to the chassis, one to the grid of the second r-f tube, and one to the plate of the first r-f tube. There are also two connectors on the rear of the unit to which are connected the a-v-c bus and the high-voltage supply. Tag all wires when removing them.

(3) Remove the four flathead screws from the top of the chassis above the unit, lift out the unit.



TOP OF SOCKET

RADIO RECEIVER BC-314-(*)		RADIO RECEIVER BC-344-(*)	
TERMINAL	VOLTS	TERMINAL	VOLTS
2	A	2	A
3	235	3	255
4	9.8	4	9.8
5	3.8	5	3.8
7	A	7	A
8	3.8	8	3.8

NOTE: A-HEATER VOLTAGE MEASURED BETWEEN TERMINALS 2 AND 7. VOLTAGE SHALL BE BETWEEN 6.3 AND 7.0 VOLTS.

Figure 20. First r-f amplifier, schematic diagram.

41. Second R-f Amplifier

a. Special Circuit Features. The receiver second r-f amplifier is conventional. For data on the a-v-c and cathode bias circuits, see paragraph 50. Refer to the receiver schematic diagram (fig. 47) to check the B+ bus.

b. Voltage and Resistance Measurements. The voltage and resistance measurements shown in figure 21 are made in the manner and under the conditions listed in paragraph 40*b*.

c. Parts Data.

Reference symbol	Signal Corps stock No.	Name of part and description	Function
	3D255	CAPACITOR, fixed: paper; 3-section, each 0.1 mf, +14% —6%; 400 vdcw.	
C17	3D255	CAPACITOR, fixed: one section of preceding item.	Second r-f cathode bypass.
C18	3D255	CAPACITOR, fixed: same as C17.	Second r-f screen bypass.
C19	3D255	CAPACITOR, fixed: same as C17.	Second r-f B+ bypass.
C20	3D290	CAPACITOR, variable: air; 14 plate; 4- to 50-mmf.	Band C, first detector trimmer.
C21	3D290	CAPACITOR, variable: same as C20.	Band B, first detector trimmer.
C22	3D290	CAPACITOR, variable: same as C20.	Band A, first detector trimmer.
C27	3D290	CAPACITOR, variable: same as C20.	Band D, first detector trimmer.
C46	3D340	CAPACITOR, variable: air; 13- to 256-mmf; (part of tuning capacitor).	Tunes first detector grid circuit.
C73	3D277	CAPACITOR, fixed: paper; 0.1-mf, ±10%; 400 vdcw.	Combines with R12 to form an a-v-c filter for second r-f stage.
C78	3D341	CAPACITOR, fixed: silver mica; 25 mmf, ±2%; 400 vdcw.	Tunes band B, first detector coil.
C81	3D341	CAPACITOR, fixed: same as C73.	Combines with R11 to form B+ filter to prevent interstage coupling.
C84	3D341	CAPACITOR, fixed: same as C78.	Tunes band A, first detector coil.
C86	3D341	CAPACITOR, fixed: same as C78.	Tunes band D, first detector coil.
L13, L14	3C1083A-11	COIL: (part of first detector unit assembly).	Band D, first detector transformer.
L15, L16	3C1083A-10	COIL: (part of first detector unit assembly).	Band C, first detector transformer.
L17, L18	3C1083A-9	COIL: (part of first detector unit assembly).	Band B, first detector transformer.
L19, L20	3C1083A-8	COIL: (part of first detector unit assembly).	Band A, first detector transformer.
R8	3Z4566	RESISTOR, fixed: wire-wound; 350-ohm, ±10%; 1 w.	Second r-f cathode resistor.
R9	3Z4541	RESISTOR, fixed: composition; 75,000-ohm, ±10%; ½ w.	Second r-f screen bleeder.
R10	3Z4549	RESISTOR, fixed: composition; 40,000-ohm, ±10%; ½ w.	Second r-f screen resistor.
R11	3Z4525	RESISTOR, fixed: composition; 1,000-ohm, ±10%; ½ w.	Part of B+ filter (see C81).
R12	3Z4550	RESISTOR, fixed: composition; 100,000-ohm, ±10%; ½ w.	Part of a-v-c filter (see C73).
SW6	3Z8310-2	SWITCH: single rotor; 4 position; ceramic section; (part of first detector unit assembly).	Band change, selects proper grid winding of first detector coils.
SW7	3Z8310-2	SWITCH: same as SW6.	Band change, selects proper plate winding of first detector coils.
	2C4314F.1/A3	FIRST DETECTOR UNIT ASSEMBLY: consists of capacitor C20, C22, C27, C73, C78, C81, C84, and C86; coils L13 to L20; resistor R12; switches SW6 and SW7; terminal boards; mounted in aluminum box; (used in BC-314-C to F).	
	2C4314G/A2	FIRST DETECTOR UNIT ASSEMBLY: same as above; (used in BC-314-G and BC-344-D).	

d. Removal of First Detector Unit Assembly. (1) Follow the procedure outlined in paragraph 39*e*(1) through (5).

(2) Unsolder all wires from the top and rear of the unit. Four wires are attached to connectors which protrude through the top of the chassis: one wire connects to the variable gang capacitor, one to the chassis, one to the grid of the first detector tube, and one to the plate of the second r-f tube. There are also two connectors on the rear of the unit to which are connected the a-v-c bus and the high-voltage supply. Tag all wires before removing them.

(3) From the top of the chassis, remove the four flathead screws above the unit and lift out the unit.

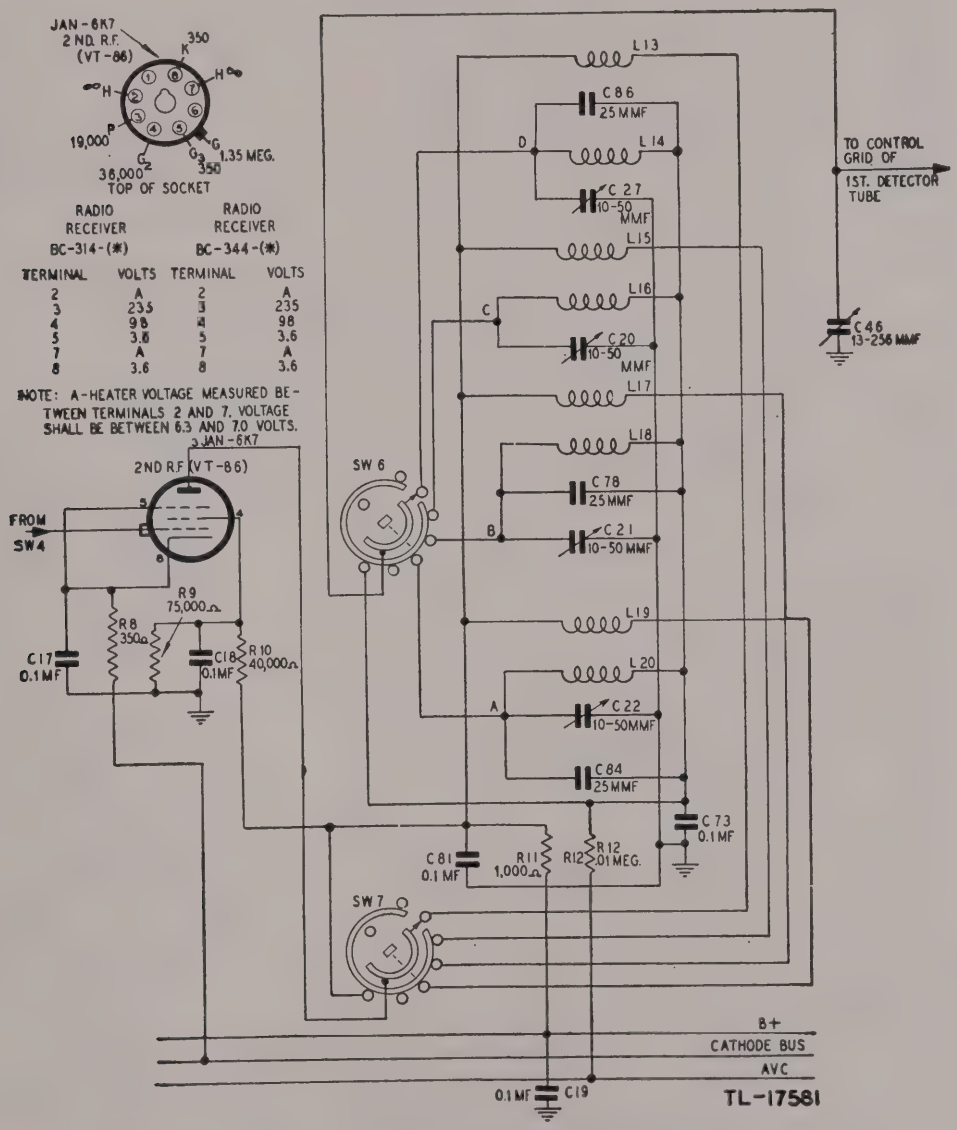


Figure 21. Second r-f amplifier, schematic diagram.

42. R - f Oscillator

a. Special Circuit Features. The receiver r-f oscillator circuit is of the plate feed-back type, with the r-f output taken from the grid circuit. Refer to the receiver schematic diagram (fig. 47) to check the B+ bus.

b. Voltage and Resistance Measurements. The voltage and resistance measurements shown in figure 22 are made in the manner and under the conditions listed in paragraph 40*b*.

c. Parts Data.

Reference symbol	Signal Corps stock No.	Name of part and description	Function
C23	3D290	CAPACITOR, variable: air; 14-plate; 4- to 50-mmf; (part of r-f oscillator unit assembly).	Band D, r-f oscillator trimmer.
C24	3D290	CAPACITOR, variable: same as C23.	Band C, r-f oscillator trimmer.
C25	3D290	CAPACITOR, variable: same as C23.	Band B, r-f oscillator trimmer.
C26	3D290	CAPACITOR, variable: same as C23.	Band A, r-f oscillator trimmer.
C28	3D348	CAPACITOR, fixed: silver mica; 2,500-mmf, ±2%; 400 vdcw.	Band D, r-f oscillator padder.
C29	3D347	CAPACITOR, fixed: silver mica; 2,000-mmf, ±2%; 400 vdcw.	Band C, r-f oscillator padder.
C30	3D346	CAPACITOR, fixed: silver mica; 900-mmf, ±2%; 400 vdcw.	Band B, r-f oscillator padder.
C31	3D345	CAPACITOR, fixed: silver mica; 800-mmf, ±2%; 400 vdcw.	Band A, r-f oscillator padder.
C66	3D346	CAPACITOR, fixed: mica; 250-mmf, +14% —6%; 250 vdcw.	Couples r-f oscillator grid to tank circuit.
C67	3D340	CAPACITOR, variable: air; 13- to 256-mmf; (part of tuning capacitor).	Tunes r-f oscillator grid circuit.
C72	3D277	CAPACITOR, fixed: paper; 0.1-mf, ±10%; 400 vdcw.	R-f oscillator B+ supply by-pass.
L21, L22	3C1083A-15	COIL: (part of r-f oscillator unit assembly).	Band D, r-f oscillator transformer.
L23, L24	3C1083A-14	COIL: (part of r-f oscillator unit assembly).	Band C, r-f oscillator transformer.
L25, L26	3C1083A-13	COIL: (part of r-f oscillator unit assembly).	Band B, r-f oscillator transformer.
L27, L28	3C1083A-12	COIL: (part of r-f oscillator unit assembly).	Band A, r-f oscillator transformer.
R13	3Z4539	RESISTOR, fixed: composition; 30,000-ohm, ±10%; 1 w.	R-f oscillator plate voltage dropping resistor.
R38	3Z4531	RESISTOR, fixed: composition; 50,000-ohm, ±10%; ½ w.	R-f oscillator grid resistor.
SW8	3Z8310-2	SWITCH: single rotor; 4-position; ceramic section; (part of r-f oscillator unit assembly).	Band change, selects proper grid winding of r-f oscillator coil.
SW9	3Z8310-2	SWITCH: same as SW8.	Band change, selects proper plate winding of r-f oscillator coil.
	2C4314F.1/A4	R-F OSCILLATOR UNIT ASSEMBLY: consists of capacitors C23 to C26, C28 to C31; coils L21 to L28; switches SW8 and SW9; terminal strips; mounted in aluminum box; (used in BC-314-C, -D, -E and -F).	
	2C4314G/A1	R-F OSCILLATOR UNIT ASSEMBLY: same as above; (used in BC-314-G and BC-344-D).	

d. Removal of R-f Oscillator Unit Assembly. (1) Rotate the BAND CHANGE switch to band A.

(2) Remove the r-f oscillator compartment cover (21 screws).

(3) Remove the shaft-locking setscrew which extends through the band switch shaft between the first r-f amplifier and the r-f oscillator units on the under side of the chassis.

(4) Using long-nose pliers, pull the shaft out through the r-f oscillator unit.

(5) Unsolder and remove the four leads attached to the top of the terminal board which is just below the socket of r-f oscillator Tube JAN-6C5 (VT-65).

(6) Remove the four flathead machine screws which attach the unit to the receiver chassis. These screws are located on the bottom of the chassis.

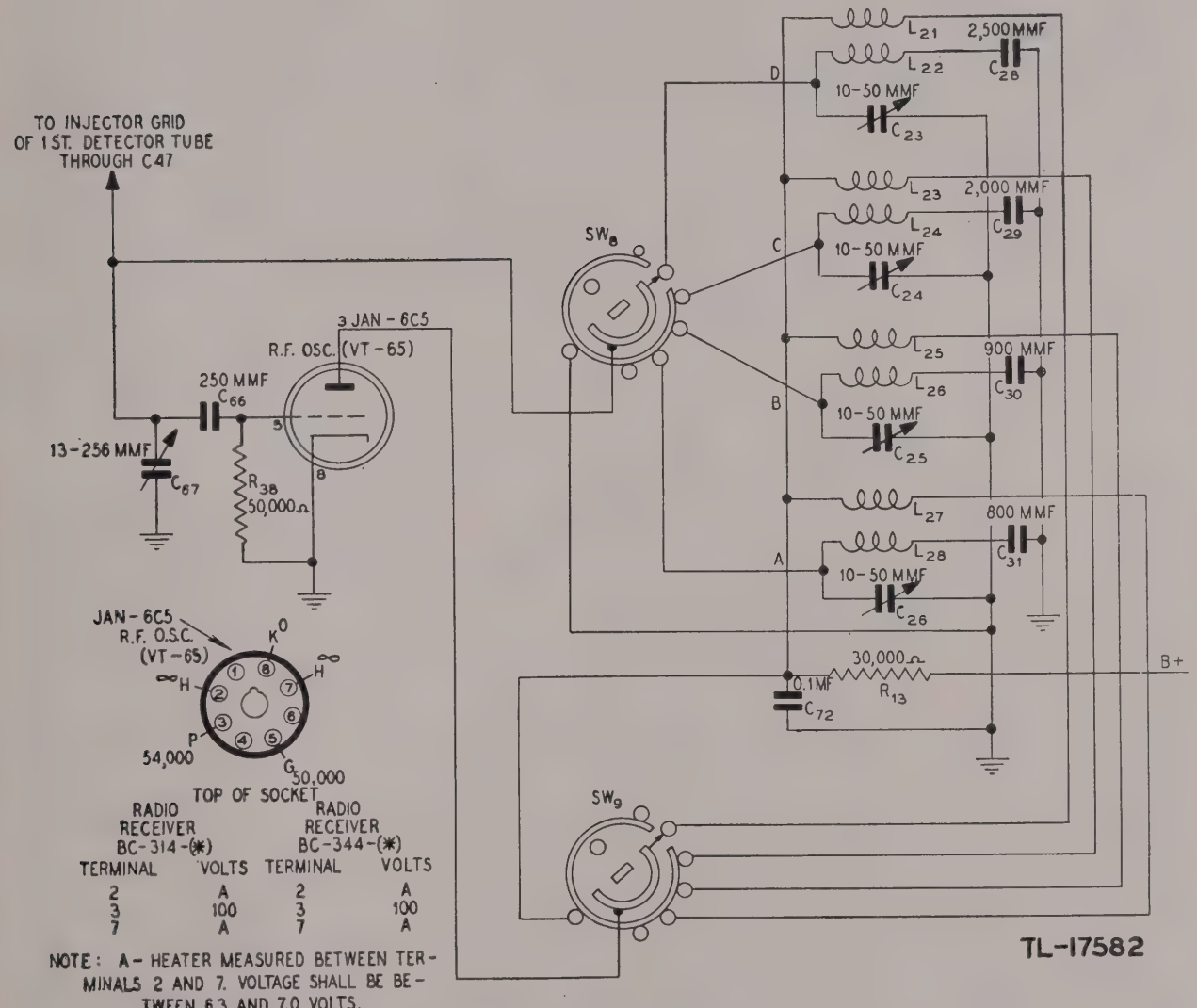


Figure 22. R-f oscillator, schematic diagram.

43. First Detector

a. Special Circuit Features. The receiver first detector circuit is conventional in Radio Receivers BC-314-C, -D, -E and -G, and in Radio Receiver BC-344-D. However, a variable selectivity control (Figs. 23 and 47) is incorporated in Radio Receivers BC-314 and BC-344. For data on the a-v-c circuit, see paragraph 50. See the receiver schematic diagram (fig. 47) to check the B+ bus.

b. Voltage and Resistance Measurements. The voltage and resistance measurements shown in figure 23 are made in the manner and under the conditions listed in paragraph 40*b*.

c. Parts Data.

Reference symbol	Signal Corps stock No.	Name of part and description	Function
C32	3D343	CAPACITOR, fixed: silver mica; 125-mmf; 400 vdcw; (used in BC-314 and BC-344).	Tunes secondary of first detector i-f transformer.
C32	3D344	CAPACITOR, fixed: silver mica; 400-mmf, ±2%; 400 vdcw.	Tunes secondary of first detector i-f transformer.
C33	3D281	CAPACITOR, fixed: paper; 0.01-mf, ±10%; 400 vdcw.	Combines with R18 to form a-v-c filter for first i-f stage.
C34	3D343	CAPACITOR, fixed: silver mica; 400-mmf, ±2%; 400 vdcw; (used in BC-314-C, -D, -E, -G and BC-344-D).	Tunes primary of first detector i-f transformer.
C34	3D344	CAPACITOR, fixed: silver mica; 125-mmf, ±2%; 400 vdcw; (used in BC-314 and BC-344).	Tunes primary of first detector i-f transformer.
C35	3D281	CAPACITOR, fixed: same as C33.	Combines with R17 to form B+ filter to prevent interstage coupling.
C47	3D349	CAPACITOR, fixed: mica; 150-mmf, +14% —6%; 250 vdcw.	Couples r-f oscillator to first detector stage.
	3D255	CAPACITOR, fixed: paper; 3-section; each 0.1-mf, +14% —6%; 400 vdcw.	
C48	3D255	CAPACITOR, fixed: (one section of above item).	First detector cathode bypass.
C49	3D255	CAPACITOR, fixed: same as C48.	First detector screen bypass.
C50	3D255	CAPACITOR, fixed: same as C48.	First detector B+ bypass.
C79	3D351	CAPACITOR, variable: air; 30-mmf; (used in BC-314 and BC-344 only (fig. 23)).	Varies selectivity of first detector i-f transformer.
L29 and L30	2Z9892	TRANSFORMER: assembly consists of 2 windings; 2 iron cores; capacitors C32 to C35; resistors R17, R18.	Couples first detector output to input of first i-f stage.
R14	2Z4568	RESISTOR, fixed: composition; 50,000-ohm, ±10%; ⅓w.	Control grid load for first detector tube.
R15	3Z4564	RESISTOR, fixed: wire-wound; 500-ohm, ±10%; 1 w.	First detector cathode resistor.
R16	3Z4540	RESISTOR, fixed: composition; 30,000-ohm, ±10%; ½w.	First detector screen dropping resistor.
R17	3Z4525	RESISTOR, fixed: composition; 1,000-ohm, ±10%; ⅓ w.	Part of B+ filter (see C35).
R18	3Z4550	RESISTOR, fixed: composition; 100,000-ohm, ±10%; ½ w.	Part of a-v-c filter (see C33).
R45	3Z4550	RESISTOR, fixed: same as R18; (used in BC-314 and BC-344).	First detector screen dropping resistor.
R45	3Z4541	RESISTOR, fixed: composition; 75,000-ohm, ±10%; ½ w; (used in BC-314-C, -D, -E, and -G, and BC-344-D).	First detector screen dropping resistor.
R53	3Z4540	RESISTOR, fixed: composition; 30,000-ohm, ±10%; ½ w.	First detector screen bleeder.

d. Removal of First Detector Transformer. (1) Remove the dynamotor or rectifier as directed in paragraph 9.

(2) From the under side of the chassis, remove the screws which support the transformer.

(3) Disconnect the three leads to the transformer, tagging each lead before it is unsoldered.

(4) Lift the transformer out of the chassis.

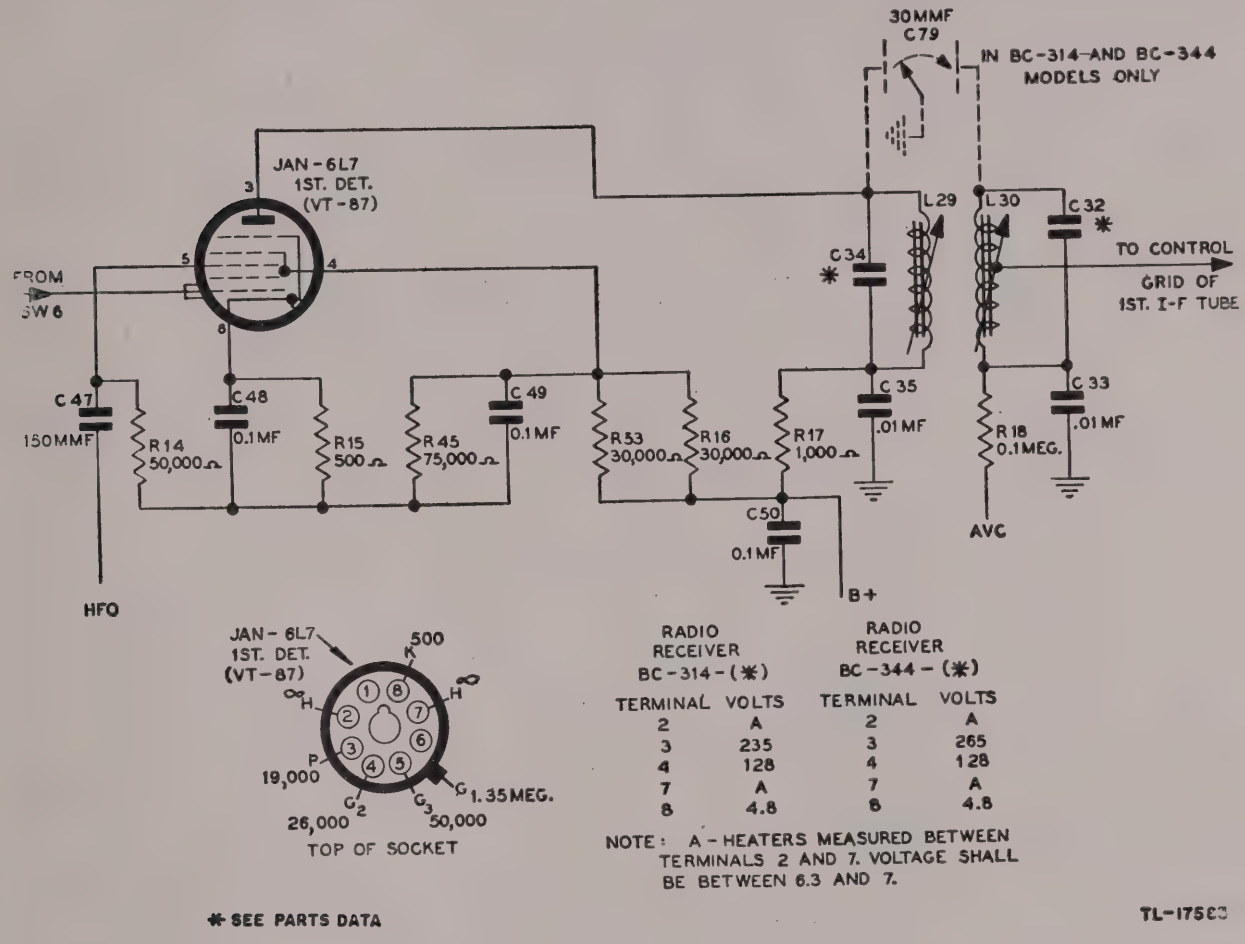


Figure 23. First detector, schematic diagram.

44. First I-f Amplifier

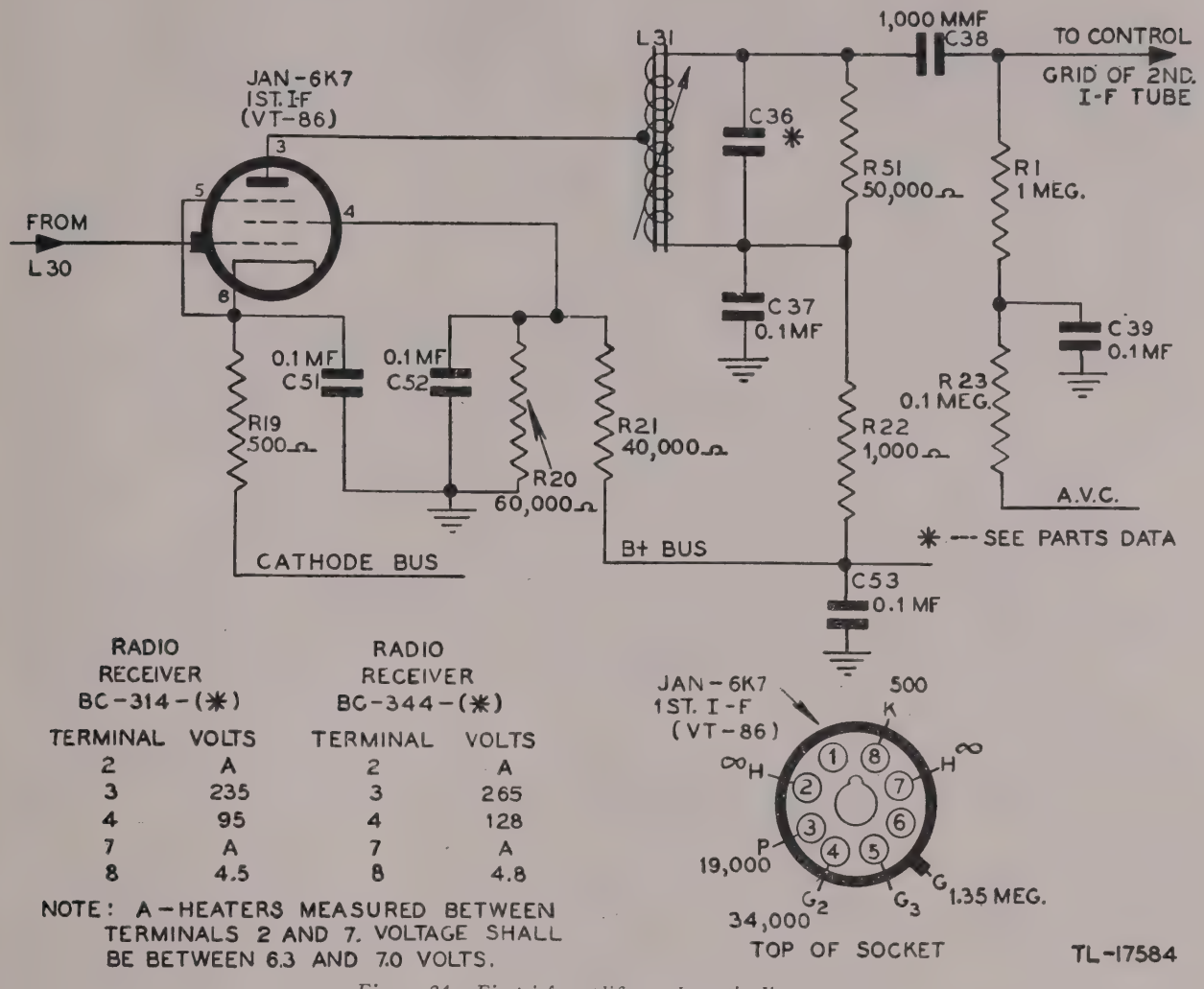
a. Special Circuit Features. The first i-f amplifier circuit is an impedance-coupled device consisting of coil L31 and capacitors C36 and C38. Data on the a-v-c and cathode circuits are given in paragraph 50. Refer to the receiver schematic (fig. 47) to check the B+ bus.

b. Voltage and Resistance Measurements. The voltage and resistance measurements shown in figure 24 are made in the manner and under the conditions listed in paragraph 40*b*.

c. Parts Data.

Reference symbol	Signal Corps stock No.	Name of part and description	Function
C36	3D344	CAPACITOR, fixed: silver mica; 400-mmf, ±2%; 400 vdcw; (used in BC-314-C, -D, -E, and -G and BC-344-D).	Tunes first i-f transformer.
C36	3D343	CAPACITOR, fixed: silver mica; 125-mmf; 400 vdcw; (used in BC-314 and BC-344 (fig. 24)).	
C37	3D277	CAPACITOR, fixed: paper; 0.1 mf, ±10%; 400 vdcw.	Combines with R22 to form B+ filter to prevent interstage coupling.
C38	3D352	CAPACITOR, fixed: mica; 1,000 mmf; ±2%; 400 vdcw; (used in BC-314 and BC-344).	Couples first i-f output to second i-f grid.
C38	3D372	CAPACITOR, fixed: silver mica; 1,000-mmf; ±2%; 250 vdcw.	Couples first i-f output to second i-f grid.
C39	3D277	CAPACITOR, fixed: paper; 0.1 mf; ±10%; 400 vdcw.	Combines with R23 to form a-v-c filter for second i-f stage.
	3D399	CAPACITOR, fixed: paper; 3-section; each 0.1-mf; +14% —6%; 400 vdcw.	
C51	3D399	CAPACITOR, fixed: (part of preceding item).	First i-f cathode bypass.
C52	3D399	CAPACITOR, fixed: same as C51.	First i-f screen bypass.
C53	3D399	CAPACITOR, fixed: same as C51.	First i-f B+ bypass.
L31	2Z9893	TRANSFORMER: assembly consists of 1 winding; 1 iron core; capacitors C36 to C39; resistors R1, R51; terminal strip.	First i-f transformer couples first i-f output to second i-f grid.
R1	3Z4561	RESISTOR, fixed: composition; 1-megohm, ±10%; ⅓ w.	Second i-f grid load.
R19	3Z4564	RESISTOR, fixed: wirewound; 500-ohm, ±10%; 1 w.	First i-f cathode resistor.
R20	3Z4563	RESISTOR, fixed: composition; 60,000-ohm, ±10%; 1 w.	First i-f screen bleeder.
R21	3Z4549	RESISTOR, fixed: composition; 40,000-ohm, ±10%; ½ w.	First i-f screen dropping resistor.
R22	3Z4567	RESISTOR, fixed: composition; 1,000-ohm, ±10%; ⅓ w.	Part of B+ filter (see C37).
R23	3Z4550	RESISTOR, fixed: composition; 100,000-ohm, ±10%; ½ w.	Part of a-v-c filter (see C39).
R51	3Z4531	RESISTOR, fixed: composition; 50,000-ohm, ±10%; ½ w.	First i-f transformer shunt.

d. Removal of First I-f Transformer. Follow the procedure outlined in paragraph 43*d*.



RADIO RECEIVER BC-314-(✱)		RADIO RECEIVER BC-344-(✱)	
TERMINAL	VOLTS	TERMINAL	VOLTS
2	A	2	A
3	235	3	265
4	95	4	128
7	A	7	A
8	4.5	8	4.8

NOTE: A-HEATERS MEASURED BETWEEN TERMINALS 2 AND 7. VOLTAGE SHALL BE BETWEEN 6.3 AND 7.0 VOLTS.

Figure 24. First i-f amplifier, schematic diagram.

45. Second I-f Amplifier

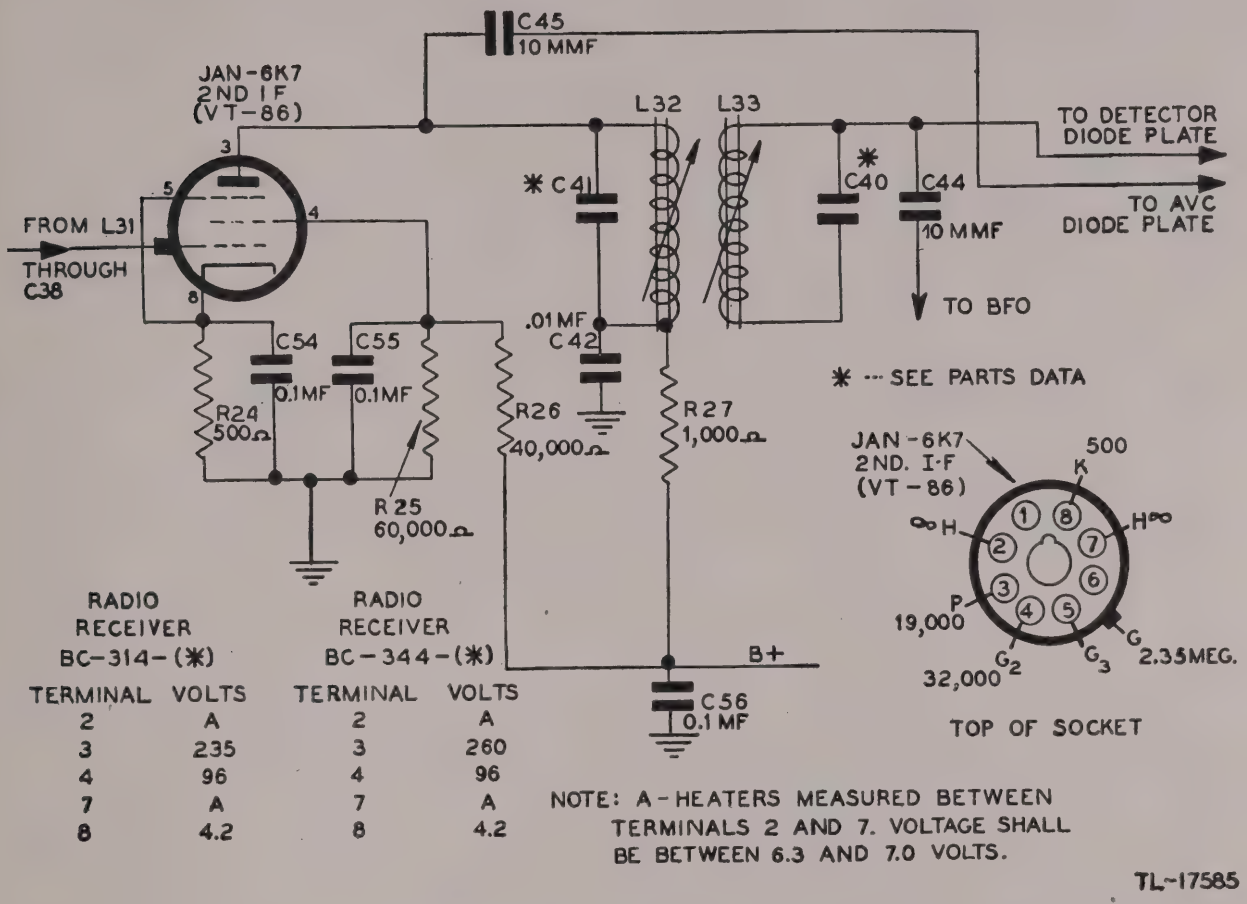
a. Special Circuit Features. The second i-f amplifier circuit is conventional. Signal voltage is taken from the primary of the second i-f transformer and rectified by the second detector for a-v-c voltage. The signal voltage which appears across the secondary of the transformer is coupled to the detector plate of the second detector. Data on the a-v-c circuit are given in paragraph 50. Refer to the receiver schematic diagram (fig. 47) to check the B+ bus.

b. Voltage and Resistance Measurements. The voltage and resistance measurements shown in figure 25 are made in the manner and under the conditions listed in paragraph 40*b*.

c. Parts Data.

Reference symbol	Signal Corps stock No.	Name of part and description	Function
C40	3D343	CAPACITOR, fixed: silver mica; 125-mmf; 400 vdcw; (used in BC-314 and BC-344 only (fig. 25)).	Tunes secondary of second i-f transformer.
C40	3D344	CAPACITOR, fixed: silver mica; 400 mmf, ±2%; 400 vdcw; (used in BC-314-C, -D, -E and -G and BC-344-D (fig. 25)).	Tunes secondary of second i-f transformer.
C41	3D344	CAPACITOR, fixed: same as C40.	Tunes primary of second i-f transformer.
C42	3D281	CAPACITOR, fixed: paper; 0.01 mf, ±10%; 400 vdcw; (used in BC-314, BC-314-G, BC-344, and BC-344-D).	Combines with R27 to form B+ filter to prevent interstage coupling.
C42	3D371	CAPACITOR, fixed: mica; 0.01-mf, ±10%; 450 vdcw; (used in BC-314-C, -D, -E).	Combines with R27 to form B+ filter to prevent interstage coupling.
C44	3D279	CAPACITOR, fixed: mica; 10 mmf, +14% —6%; 300 vdcw.	Couples BFO to second detector diode circuit.
C45	3D350	CAPACITOR, fixed: mica; 25 mmf, +14% —6%; 300 vdcw.	Couples second i-f plate circuit to a-v-c diode plate.
	3D338	CAPACITOR, fixed: paper; 3-section; each 0.1-mf, +14% —6%; 400 vdcw.	
C54	3D338	CAPACITOR, fixed: (part of preceding item).	Second i-f cathode bypass.
C55	3D338	CAPACITOR, fixed: same as C54.	Second i-f screen bypass.
C56	3D338	CAPACITOR, fixed: same as C54.	Second i-f B+ bypass.
L32, L33	2Z9894	TRANSFORMER: assembly consists of 2 windings; 2 iron cores; capacitors C40 to C42.	Second i-f transformer, couples second i-f output to first detector diode plates.
R24	3Z4564	RESISTOR, fixed: wire-wound; 500-ohm, ±10%; 1 w.	Second i-f cathode resistor.
R25	3Z4563	RESISTOR, fixed: composition; 60,000-ohm, ±10%; 1 w.	Second i-f screen bleeder resistor.
R26	3Z4549	RESISTOR, fixed: composition; 40,000-ohm, ±10% ½ w.	Second i-f screen dropping resistor.
R27	3Z4525	RESISTOR, fixed: composition; 1,000-ohm, ±10% ½ w.	Part of B+ filter (see C42).

d. Removal of Second I-f Transformer. Follow the procedure outlined in paragraph 43*d*.



TERMINAL	VOLTS	TERMINAL	VOLTS
2	A	2	A
3	235	3	260
4	96	4	96
7	A	7	A
8	4.2	8	4.2

Figure 25. Second i-f amplifier, schematic diagram.

46. Second Detector and First Audio Amplifier

a. Special Circuit Features. The receiver second detector and first audio circuit is conventional. Refer to the receiver schematic diagram (fig. 47) to check the B+ bus.

b. Voltage and Resistance Measurements. The voltage and resistance measurements shown in figure 26 are made in the manner and under the conditions listed in paragraph 40*b*.

c. Parts Data.

Reference symbol	Signal Corps stock No.	Name of part and description	Function
C43	3D281	CAPACITOR, fixed: paper; 0.01-mf; ±10%; 400 vdcw.	Couples first audio output to audio output stage.
	3D338	CAPACITOR, fixed: paper; 3-section; each 0.1-mf, +14% —6%; 400 vdcw.	
C57	3D338	CAPACITOR, fixed: (part of preceding item).	Second detector, first audio B+ bypass.
C58	3D338	CAPACITOR, fixed: same as C57	Second detector, first audio cathode bypass.
C59	3D338	CAPACITOR, fixed: same as C57.	Combines with R31 to form a-v-c filter.
C75	3D193	CAPACITOR, fixed: mica; 500 mmf, +14% —6%; 250 vdcw.	Second detector r-f filter.
C80	3D297	CAPACITOR, fixed: silver mica, 1,600-mf, ±2%; 250 vdcw.	Second detector r-f filter.
C64	3D281	CAPACITOR, fixed: paper; 0.01-mf, ±10%; 400 vdcw.	First audio grid coupling capacitor.
R28	3Z4531	RESISTOR, fixed: composition; 50,000-ohm, ±10%; ½ w.	Second detector diode output load.
R29, R30	2Z7289	POTENTIOMETER, DUAL SECTION: R29 is C-500,-000 ohm, ±10%; L-taper; R30 is 0-50,000 ohms, ±10%; L-taper.	Volume control.
R31	3Z4562	RESISTOR, fixed: composition; 250,000-ohm, ±10% ½ w.	Part of a-v-c filter (see C59).
R32	3Z4561	RESISTOR, fixed: composition; 1 megohm, ±10%; ⅓ w.	A-v-c load resistor.
R34	3Z4562	RESISTOR, fixed: same as R31.	First audio grid load.
R37	3Z4571	RESISTOR, fixed: wire-wound; 750-ohm, ±10%; 1 w.	First audio cathode resistor.
R44	3Z4550	RESISTOR, fixed: composition; 100,000-ohm, ±10%; ½ w; (used in BC-314-C, -D, -E and -G and BC-344-D).	Cathode bias voltage divider.
R44	3Z4511	RESISTOR, fixed: composition; 100,000-ohm, ±10%; 1 w; (used in BC-314 and BC-344).	Cathode bias voltage divider.
SW11	3Z8119	SWITCH, rotary: 3-position.	OFF—M.V.C.-A.V.C. control.
T1	2Z9805	TRANSFORMER: audio.	Side tone monitoring input for transmitter and first audio output in some models (fig. 2).

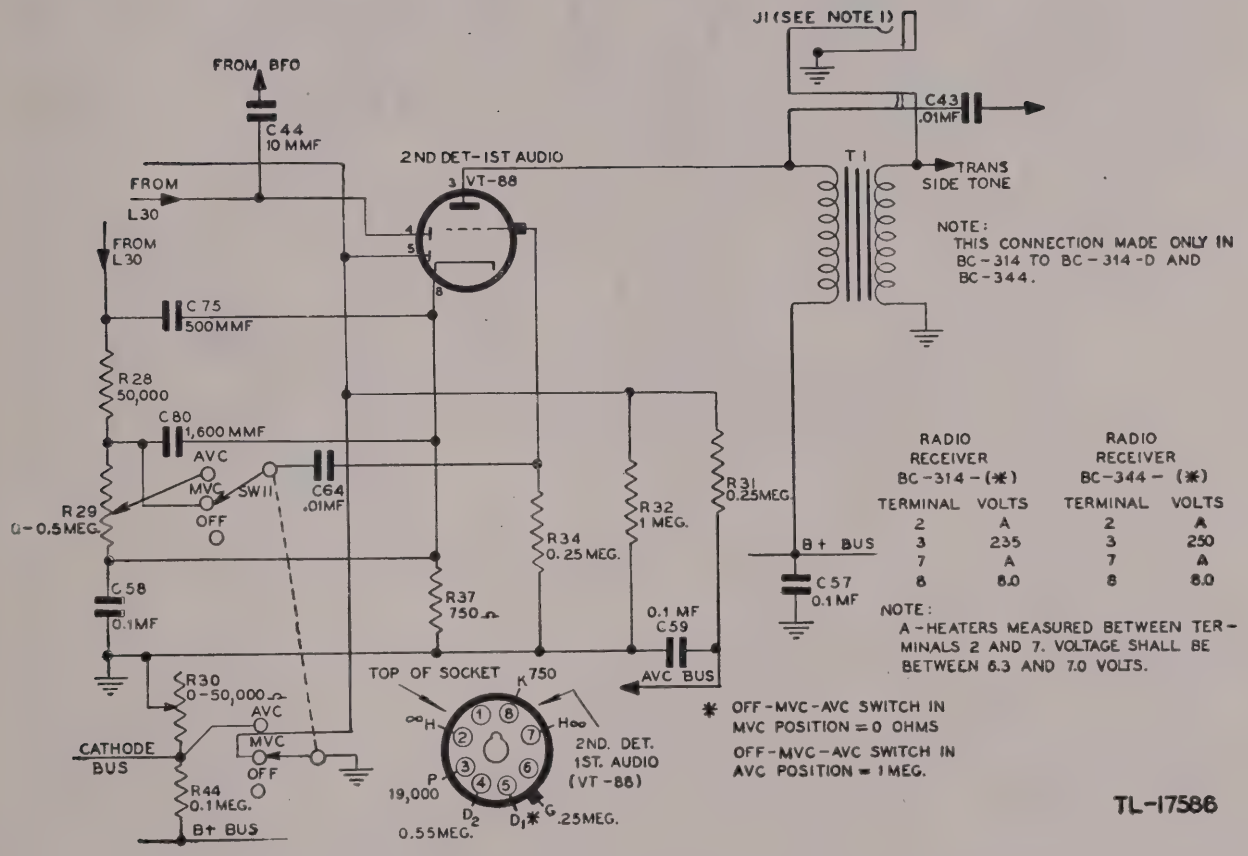


Figure 26. Second detector and first audio circuit, schematic diagram.

47. C-w Oscillator

a. Special Circuit Features. The receiver c-w oscillator uses a modified Hartley circuit. A portion of the r-f voltage developed in the tank circuit is fed through a coupling capacitor to the diode detector plate. See the schematic diagram (fig. 47) to check the B+ bus.

b. Voltage and Resistance Measurements. The voltage and resistance measurements shown in figure 27 were made in the manner and under the conditions listed in paragraph 40*b*.

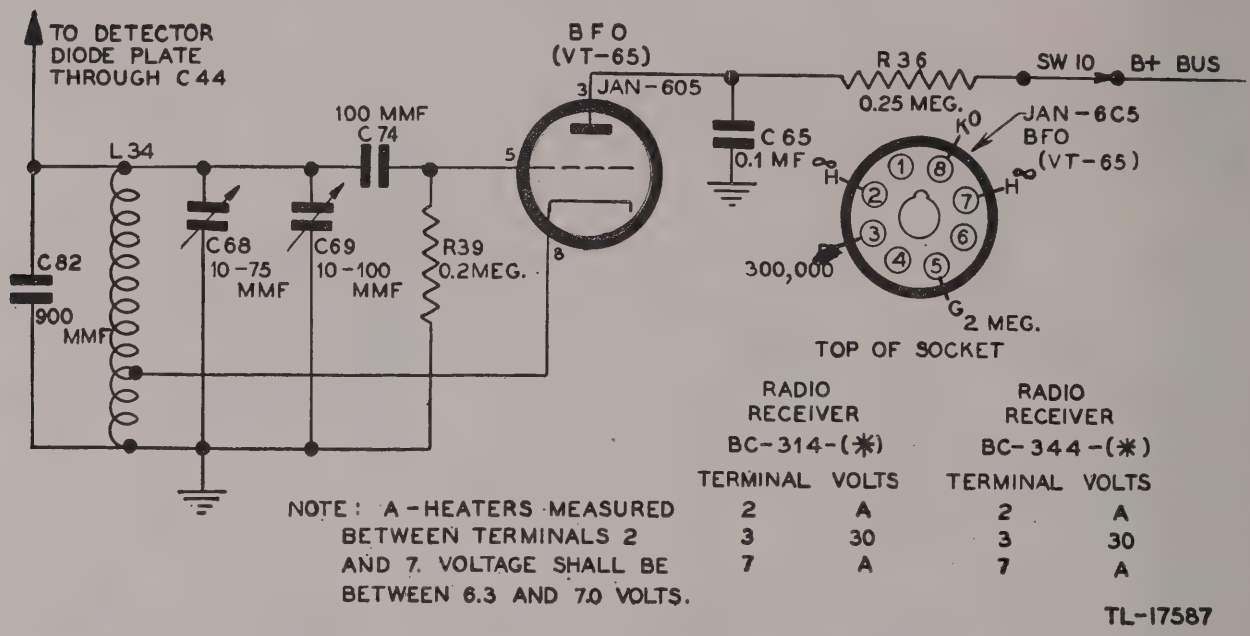


Figure 27. C-w oscillator, schematic diagram.

c. Parts Data.

Reference symbol	Signal Corps stock No.	Name of part and description	Function
C65	3D277	CAPACITOR, fixed: paper; 0.1 mf, ±10%; 400 vdcw.	C-w oscillator plate bypass.
C68	3D253	CAPACITOR, variable: air; 20-plate; 4- 75-mmf.	C-w oscillator tuning.
C69	3D384	CAPACITOR, variable: air; 27-plate; 6- 100-mmf.	C-w oscillator trimmer.
C74	3D266	CAPACITOR, fixed: mica; 500 mmf; +14% —6%; 250 vdcw.	C-w oscillator grid coupling capacitor.
C82	3D346	CAPACITOR, fixed: silver mica; 900-mmf, ±2%; 400 vdcw.	Tunes c-w oscillator coil.
L34	2C2775/4	COIL, assembly: iron core.	C-w oscillator coil.
R36	3Z4562	RESISTOR, fixed: composition; 250,000-ohm, ±10%; ½ w.	C-w oscillator plate dropping resistor.
R39	3Z4548	RESISTOR, fixed: composition; 200,000-ohm, ±10%; ½ w.	C-w oscillator grid load.

d. Removal of C-w Oscillator Unit Assembly. (1) Remove the four screws holding the shield in place; remove the shield.

(2) Remove the two roundhead screws which hold the assembly to the chassis.

(3) Remove the CW-OSC ADJUST knob, the C.W.-OSC. switch, and the machine screw located below the CW-OSC ADJUST knob.

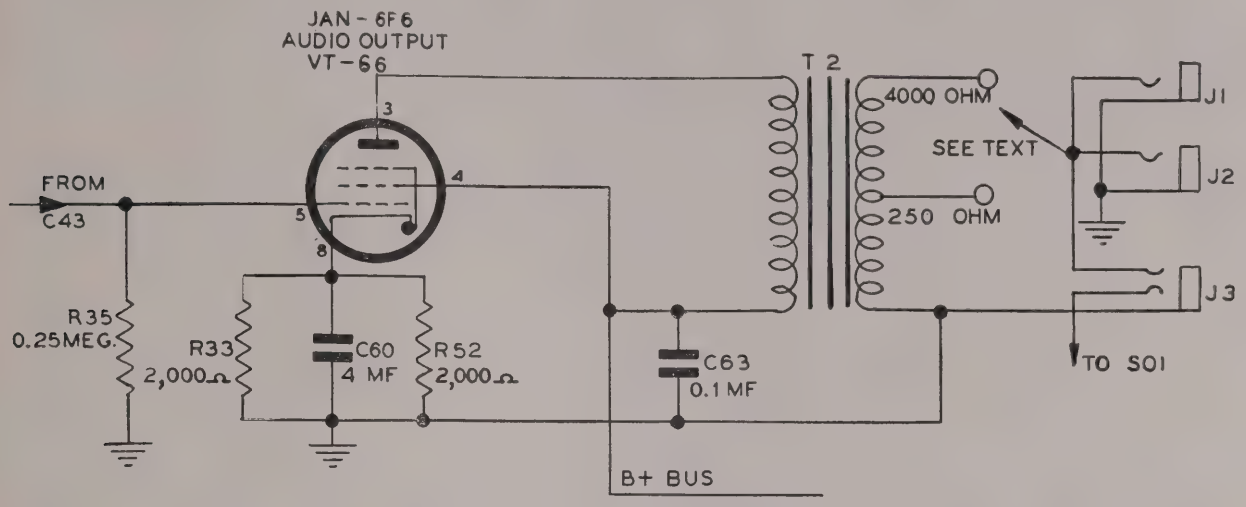
(4) Unsolder the wires attached to the terminal strip and filter coil; withdraw the unit from the chassis.

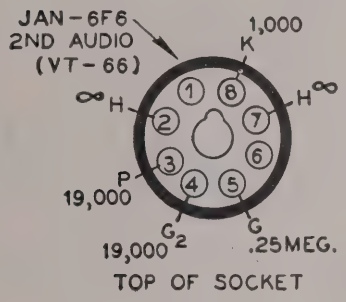
(5) Tag each wire before it is detached.

48. Second Audio Amplifier

a. Special Circuit Features. The receiver second audio circuit is conventional. Output transformer T2 did not use a 250-ohm tap in Radio Receivers BC-314 through BC-314-D and BC-344. In later models, maintenance personnel must use the 4,000-ohm tap when making the tests outlined in sections V, VI, and VII (fig. 28).

b. Voltage and Resistance Measurements. The voltage and resistance measurements shown in figure 28 are made in the manner and under the conditions listed in paragraph 40*b*.





RADIO RECEIVER BC-314-(*)		RADIO RECEIVER BC-344-(*)	
TERMINAL	VOLTS	TERMINAL	VOLTS
2	A	2	A
3	235	3	245
4	240	4	265
7	A	7	A
8	21.0	8	21.0

NOTE: A-HEATERS MEASURED BETWEEN TERMINALS 2 AND 7. VOLTAGE SHALL BE BETWEEN 6.3 AND 7.0 VOLTS.

TL-17588

Figure 28. Second audio amplifier, schematic diagram.

c. Parts Data.

Reference symbol	Signal Corps stock No.	Name of part and description	Function
C60	3D275	CAPACITOR, fixed: paper; 4-mf, +14% —6%; 50 vdcw.	Audio output cathode bypass.
C63	3D276	CAPACITOR, fixed: paper; 0.1-mf, +14% —6%; 400 vdcw; (one of 3 sections; other sections used in power supply circuit).	Audio output B+ bypass.
J1	2Z5534A	JACK, phone: open circuit.	Output for phones.
J2	2Z5534A	JACK, phone: same as J1.	Output for phones.
J3	2Z5533A	JACK, phone: 3-circuit.	Output for speaker.
R33	3Z4623	RESISTOR, fixed: wire-wound; 2,000-ohm, ±10%; 1 w.	Audio output, cathode resistor.
R35	3Z4562	RESISTOR, fixed: composition; 250,000-ohm, ±10%; ½ w.; (used in BC-314, BC-314-C, -D, and -E and BC-344).	Audio output grid load.
R35	3Z4531	RESISTOR, fixed: composition; 50,000-ohm, ±10%; ½ w.; (used in BC-314-G and BC-344-D).	Audio output grid load.
R52	3Z4623	RESISTOR, fixed: same as R33.	Audio output cathode resistor.
T2	2Z9760	TRANSFORMER, audio: 4,000-ohm impedance.	Output transformer.
T2	2Z9760A	TRANSFORMER, audio: same as above, except for 250-ohm tap.	Audio output transformer.

49. Power Supply

a. Special Circuit Features. The power supply circuit used in Radio Receiver BC-314-(*) is shown in figure 29; figure 30 shows that used in Radio Receiver BC-344-(*). Both circuits are conventional.

b. Parts Data.

Reference symbol	Signal Corps stock No.	Name of part and description	Function
	3D276	CAPACITOR, fixed: paper; 3-section; each section 0.1-mf, +14% −6%; 400 vdcw.	
C61	3D276	CAPACITOR, fixed: part of preceding item.	Tube heater, circuit bypass.
C62	3D276	CAPACITOR, fixed: same as C61.	Tube heater, circuit bypass.
C70	3D211	CAPACITOR, fixed: mica; 2,000-mmf, +14% −6%; 250 vdcw.	Thermostat bypass.
C71	3D211	CAPACITOR, fixed: same as C70.	Thermostat bypass.
F1	3Z1921A	FUSE, cartridge type: 10-amp; 250 v.	Dynamotor and filament circuit protection.
F2	2Z1921A	FUSE, cartridge type: same as F1.	Pilot lamp circuit protection.
J4	2Z5533A	JACK, microphone: 3-circuit.	Remote microphone jack for transmitter.
J5	2Z5533A	JACK, microphone: same as J4.	Remote keying jack for transmitter.
LM2, LM3	2Z5927	LAMP: miniature bayonet base; 6.3-v; 0.25-amp.	Pilot lamps.
R40	3Z4578	RESISTOR: metal enclosed; 12-ohm; 15-w.; (used in BC-314 and BC-344).	Oscillator compartment heater.
R41	3Z4578	RESISTOR: same as R40.	Same as R40.
R42	3Z4578	RESISTOR: same as R40.	Same as R40.
R43	3Z4576	RESISTOR, fixed: composition; 60-ohm, ±10%; ½ w.	Filament voltage dropping.
RL1	2Z7613	RELAY, DPST: closes at 7- 8-v; 60-ohm d-c resistance.	Send-receive switch.
SW11		SWITCH: see second detector circuit.	OFF-M.V.C.-A.V.C. control.
SW12	3Z8113	SWITCH, toggle: SPST; 3-amp; 250-v; (used in BC-314 and BC-344 only).	Oscillator compartment heater switch.
THS1	2Z9182	THERMOSTAT: 2.3-amp; 14-v; normally closed; opens at 111° F; (used in BC-314 and BC-344 (figs. 29 and 30)).	Oscillator compartment temperature control.
THS2	2Z9181	THERMOSTAT: 1.15-amp; 14-v; normally closed; opens at 109° F; (used in BC-314 and BC-344 (figs. 29 and 30)).	Oscillator compartment temperature control.

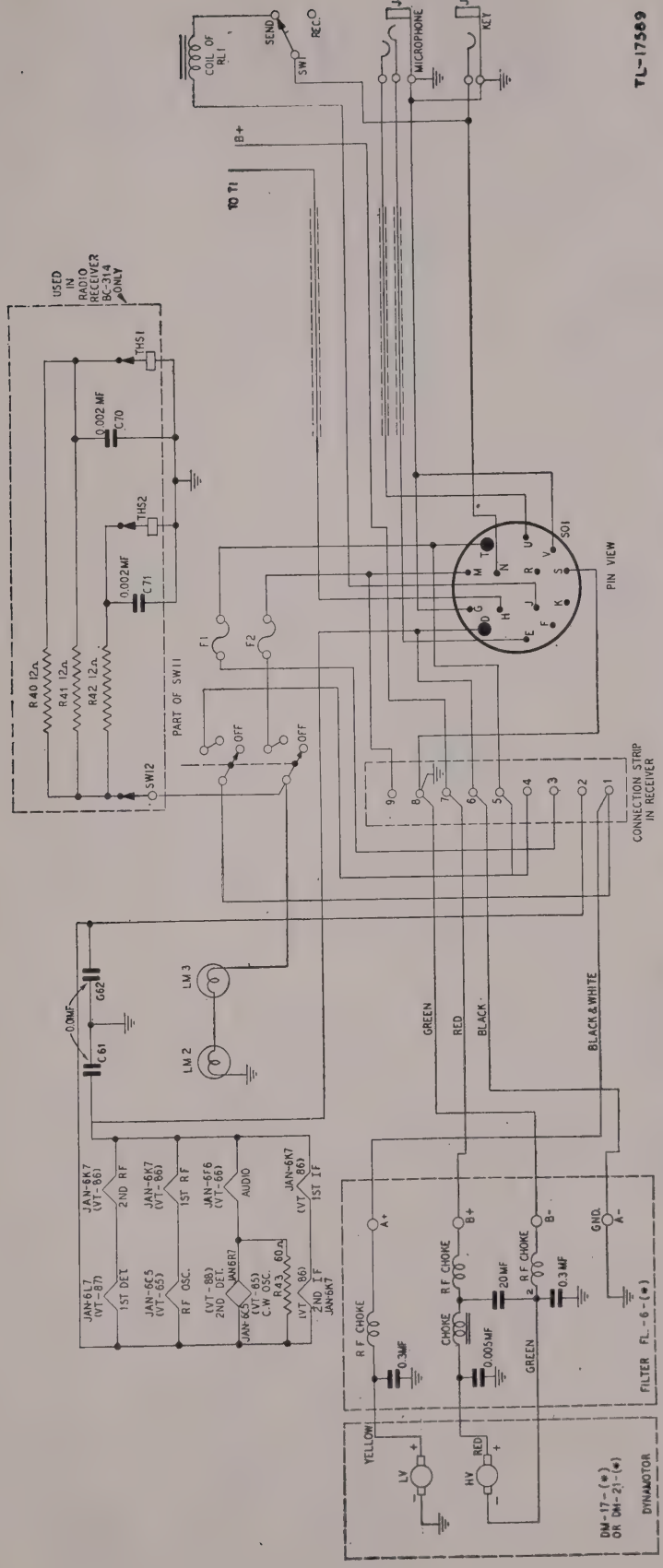


Figure 29. Radio Receiver BC-314-(*), power supply schematic diagram.

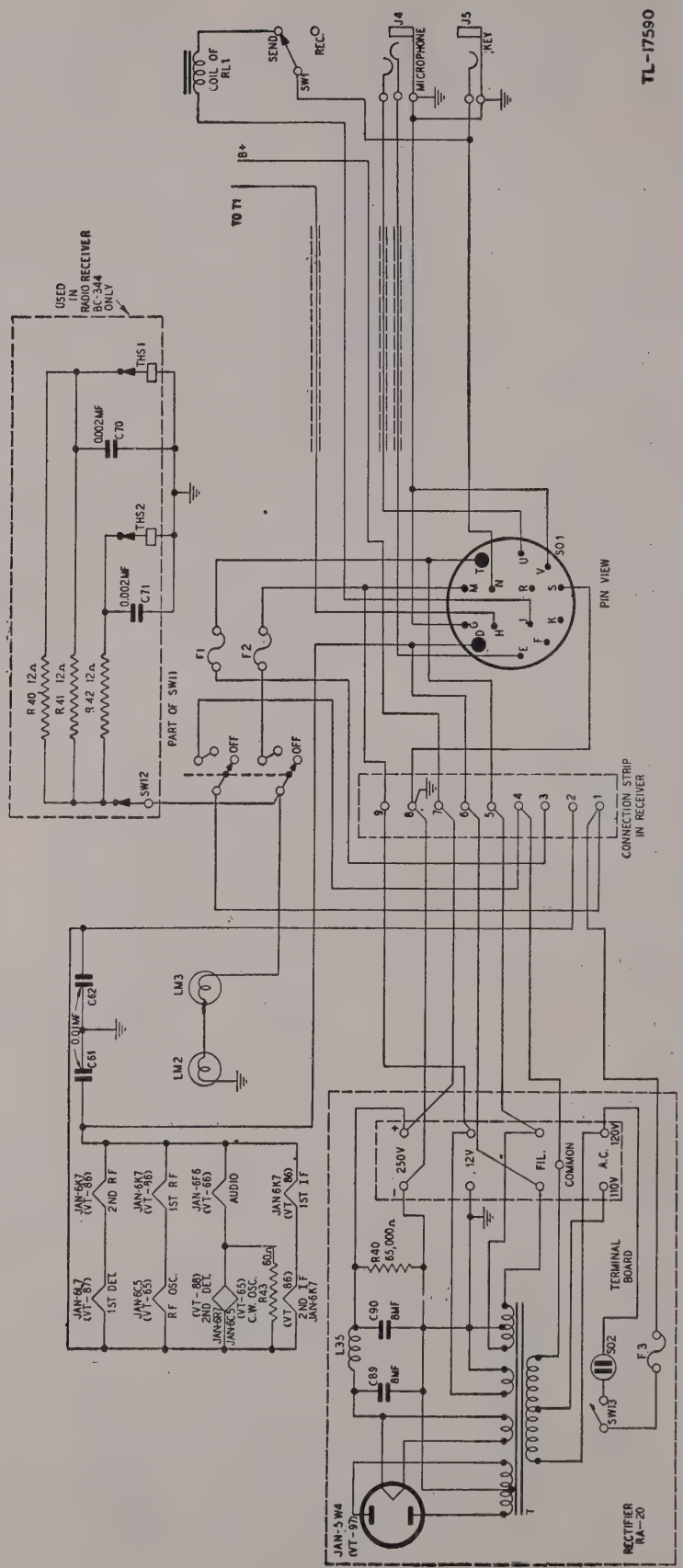


Figure 30. Radio Receiver BC-344-(*), power supply schematic diagram.

50. A-v-c and M-v-c Circuits

The automatic-volume-control and manual-volume-control circuits of the receiver are interrelated. Figure 31 shows each of these circuits in simplified form. The a-v-c filters, cathode bypasses, and coils incorporated in the receiver stages (figs. 20 through 27) and controlled by the a-v-c action, have been omitted from this simplified diagram; however, they must be considered when making a check of the circuits.

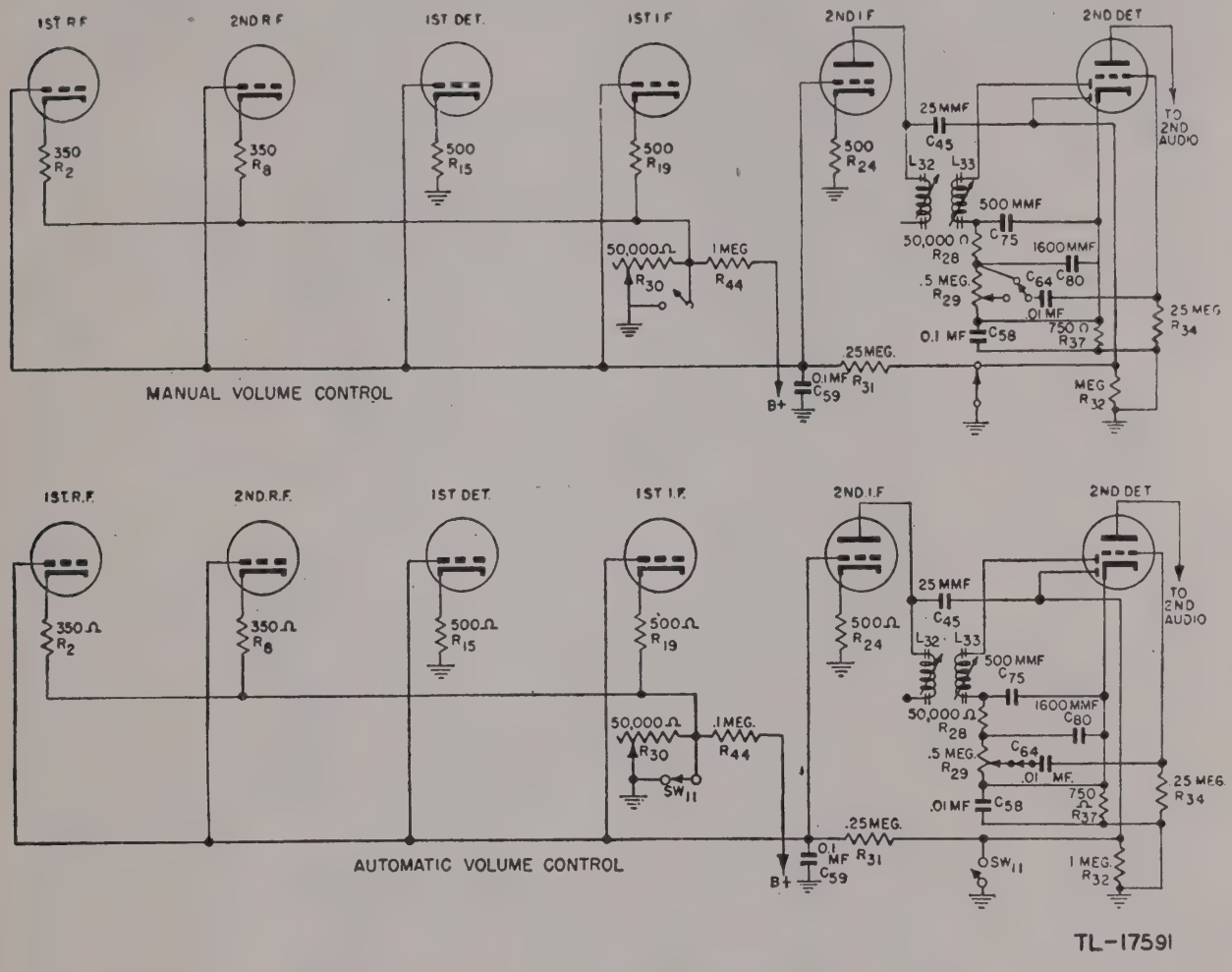


Figure 31. A-v-c and m-v-c circuits, simplified schematic diagram.

SECTION IX

SUPPLEMENTARY DATA

51. Parts Identification

The following illustrations are provided to aid in identifying and servicing the various component parts of Radio Receivers BC-314 and BC-344.

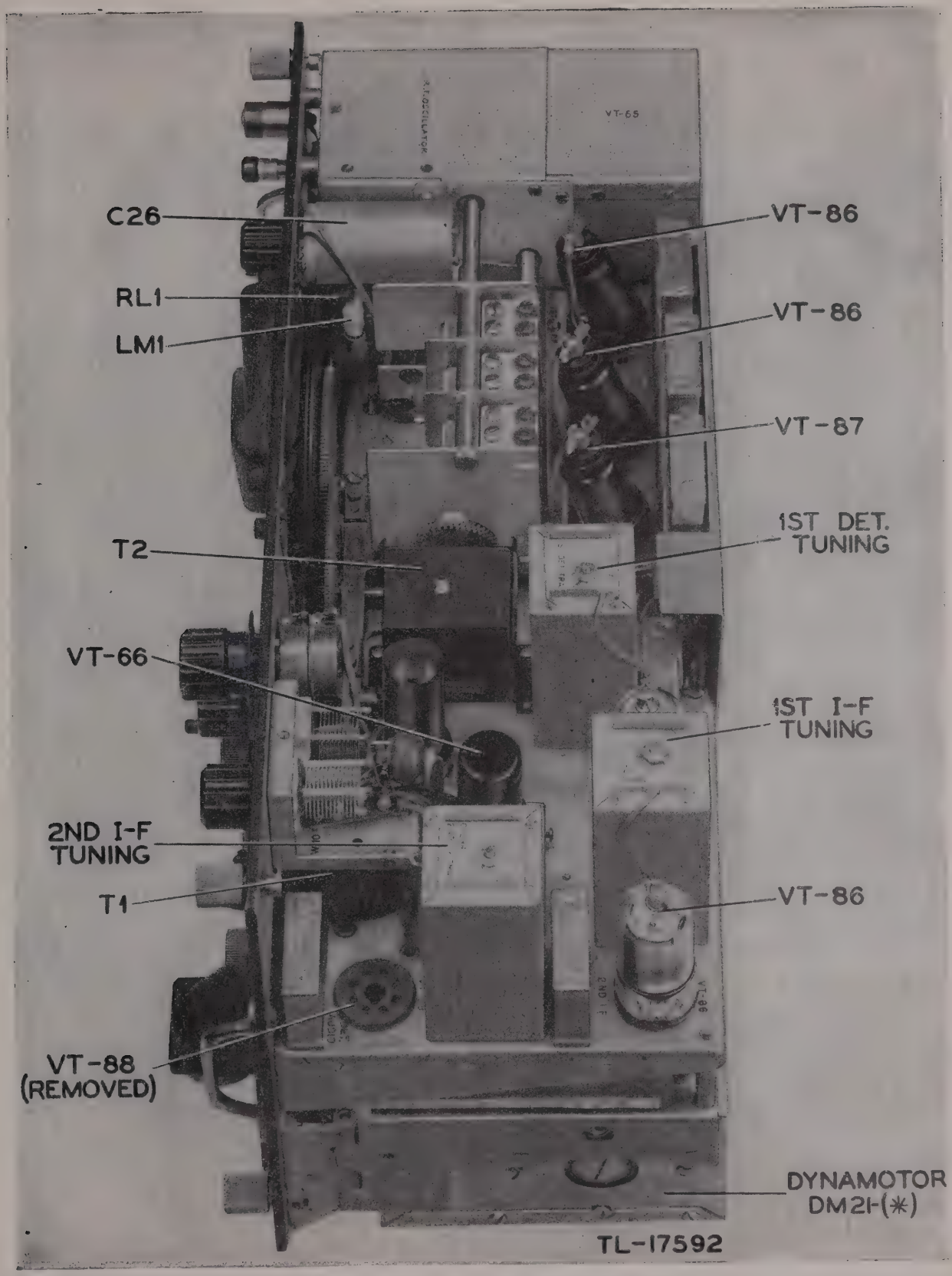


Figure 32. Receiver chassis top view, parts location.

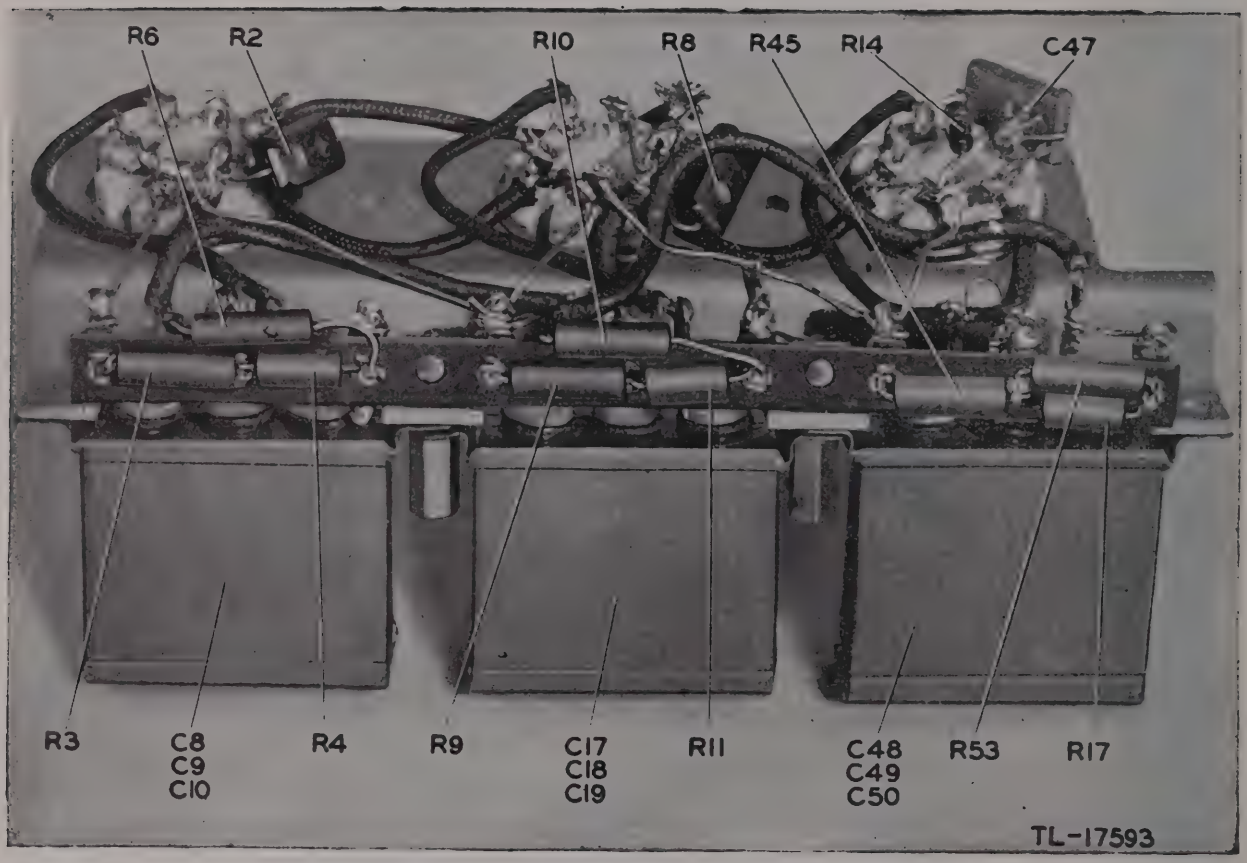


Figure 33. Receiver tube shelf, parts location.

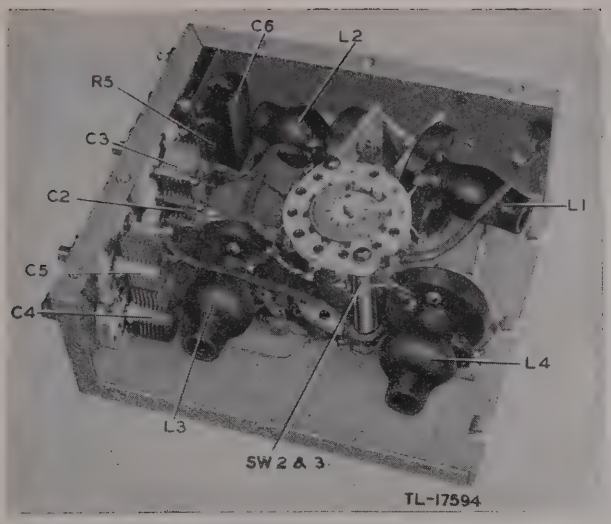


Figure 34. First r-f tuning unit, parts location.

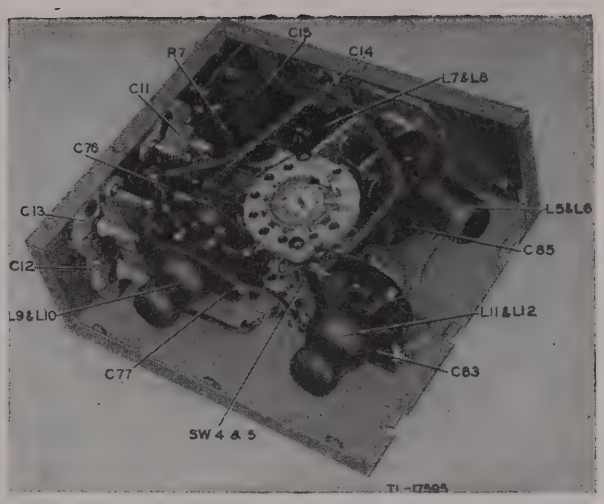


Figure 35. Second r-f tuning unit, parts location.

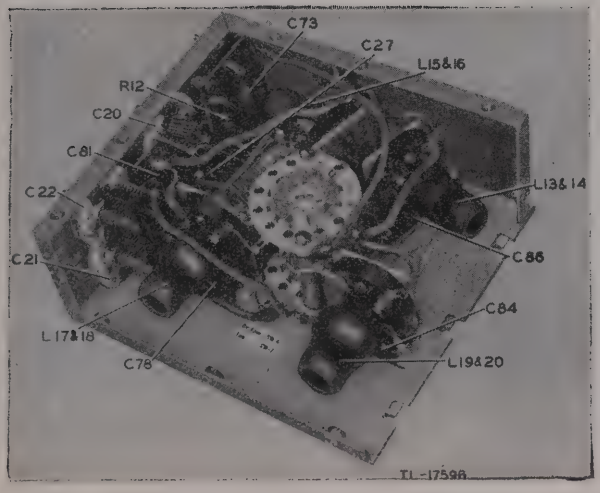


Figure 36. First detector tuning unit, parts location.

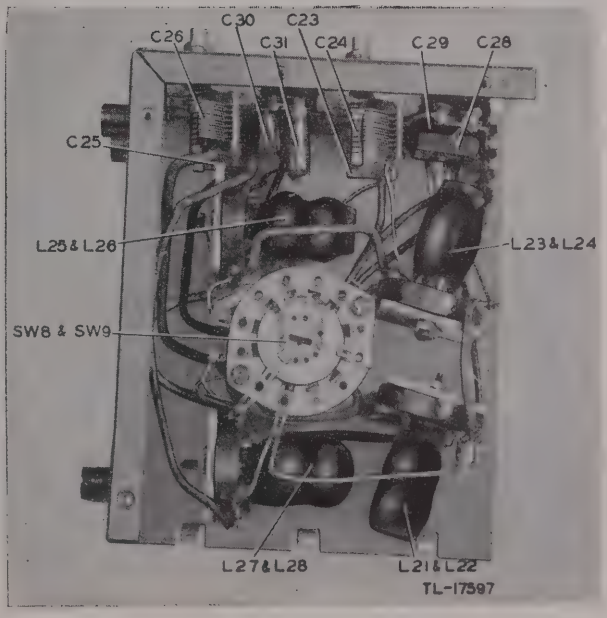


Figure 37. R-f oscillator tuning unit, parts location.

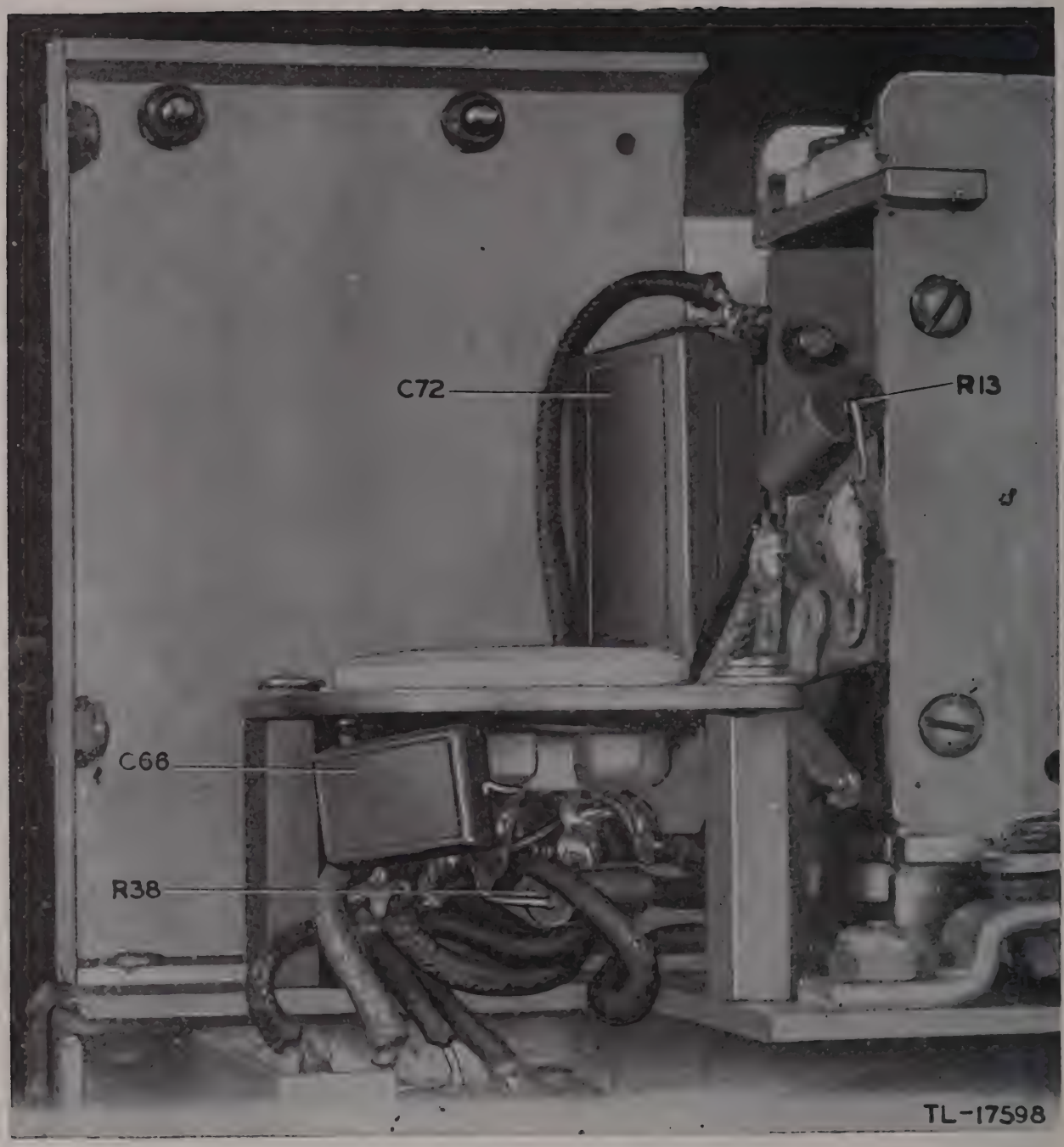


Figure 38. R-f oscillator compartment, parts location.

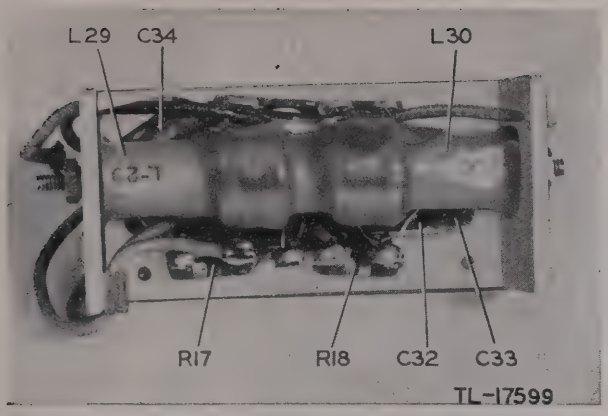


Figure 39. First detector unit assembly, parts location.

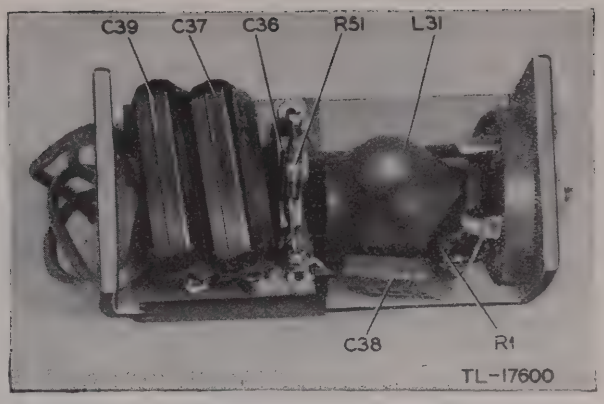


Figure 40. First i-f unit, parts location.

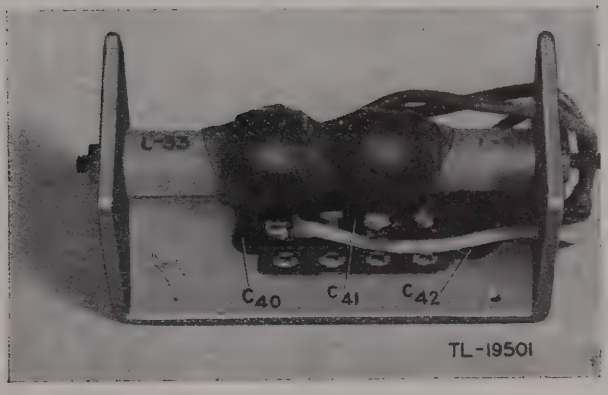


Figure 41. Second i-f unit, parts location.

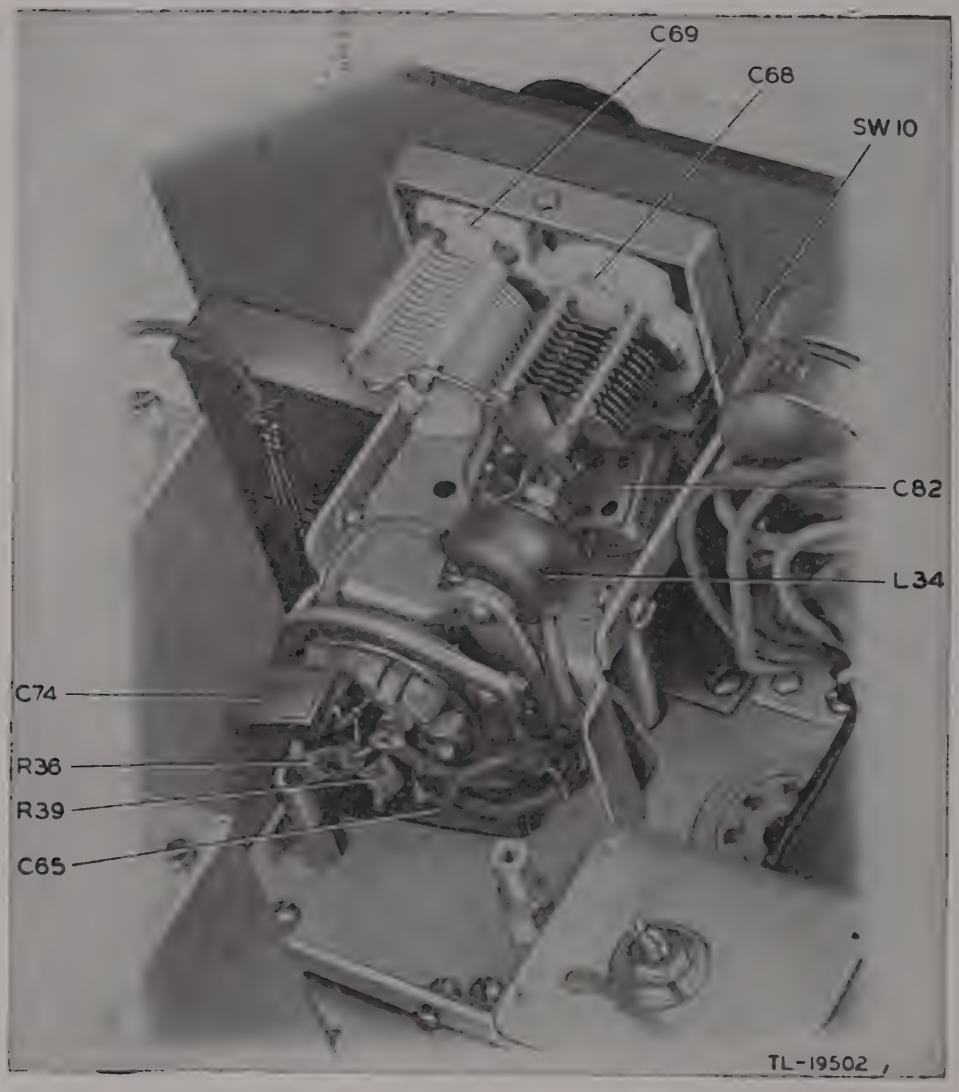


Figure 42. C-w oscillator unit, parts location.

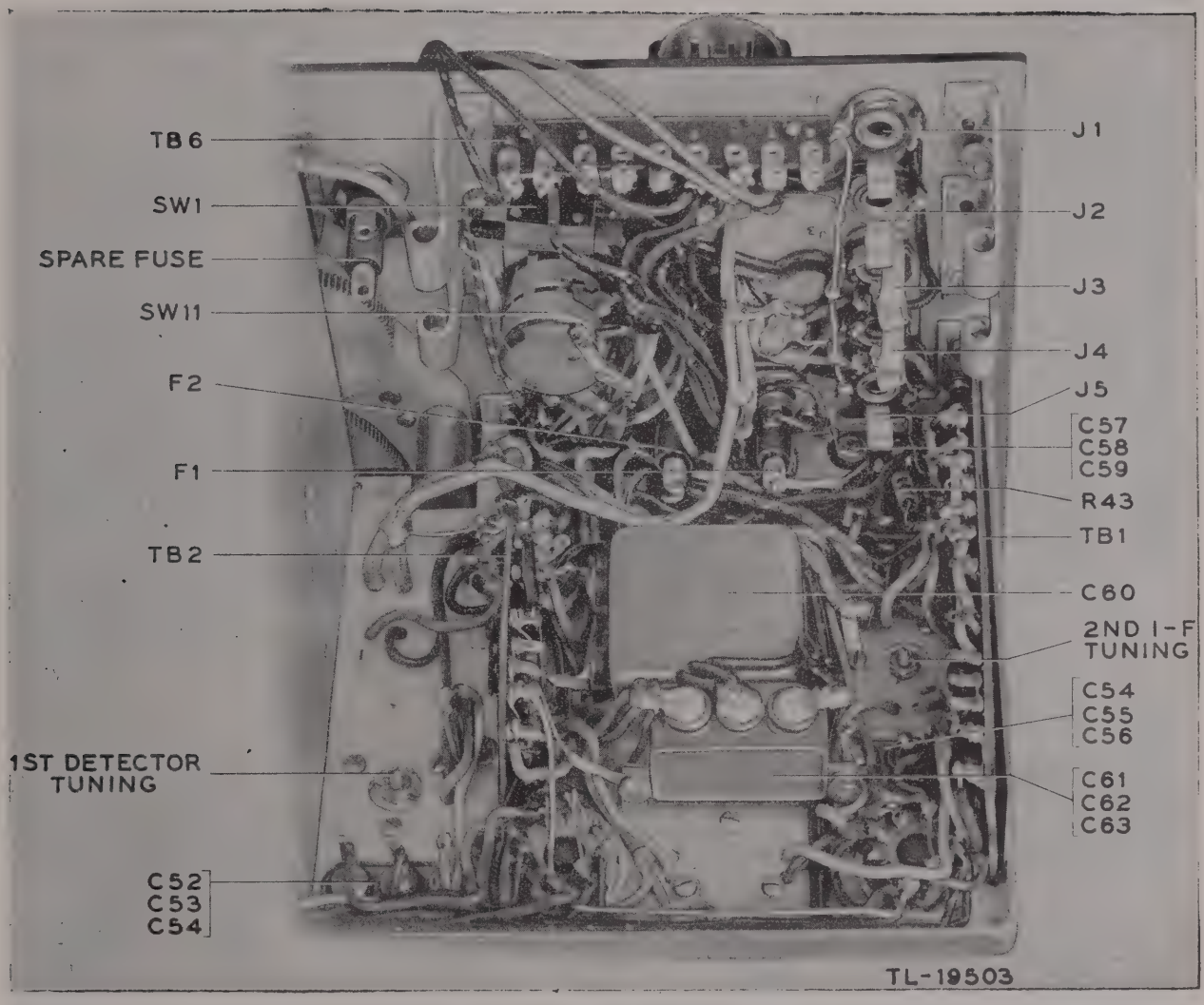


Figure 43. Chassis base, parts location.

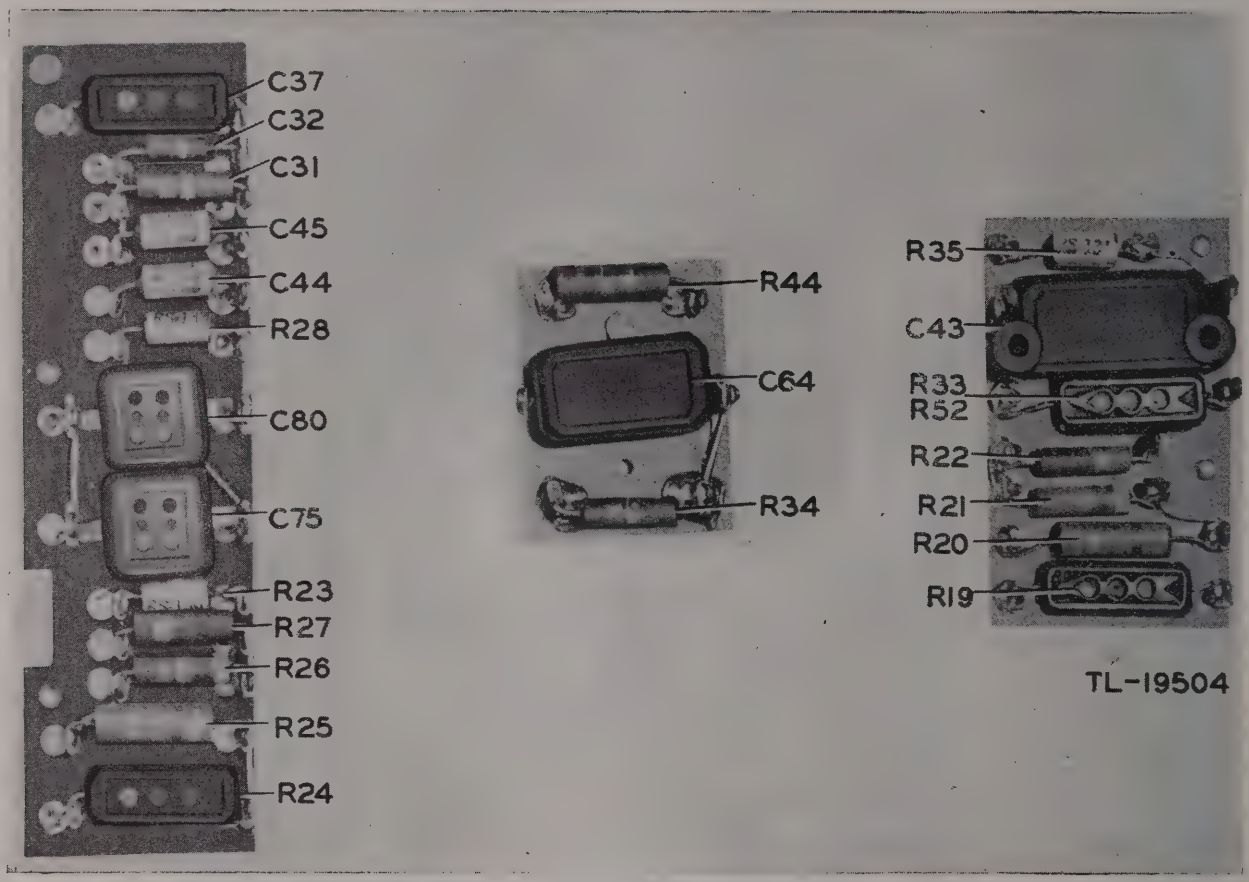


Figure 44. Terminal boards, parts location.

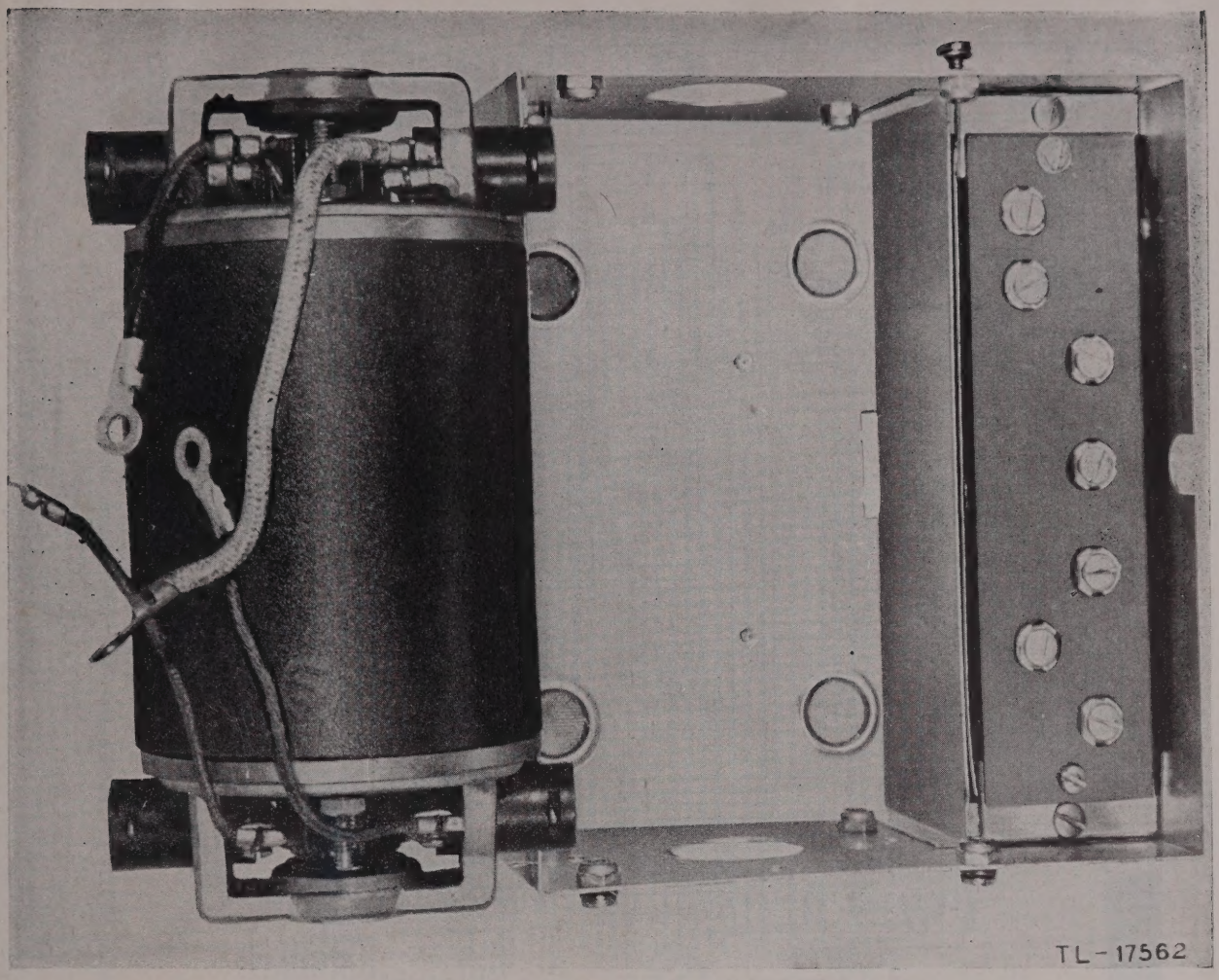


Figure 45. Dynamotor removed from dynamotor unit.

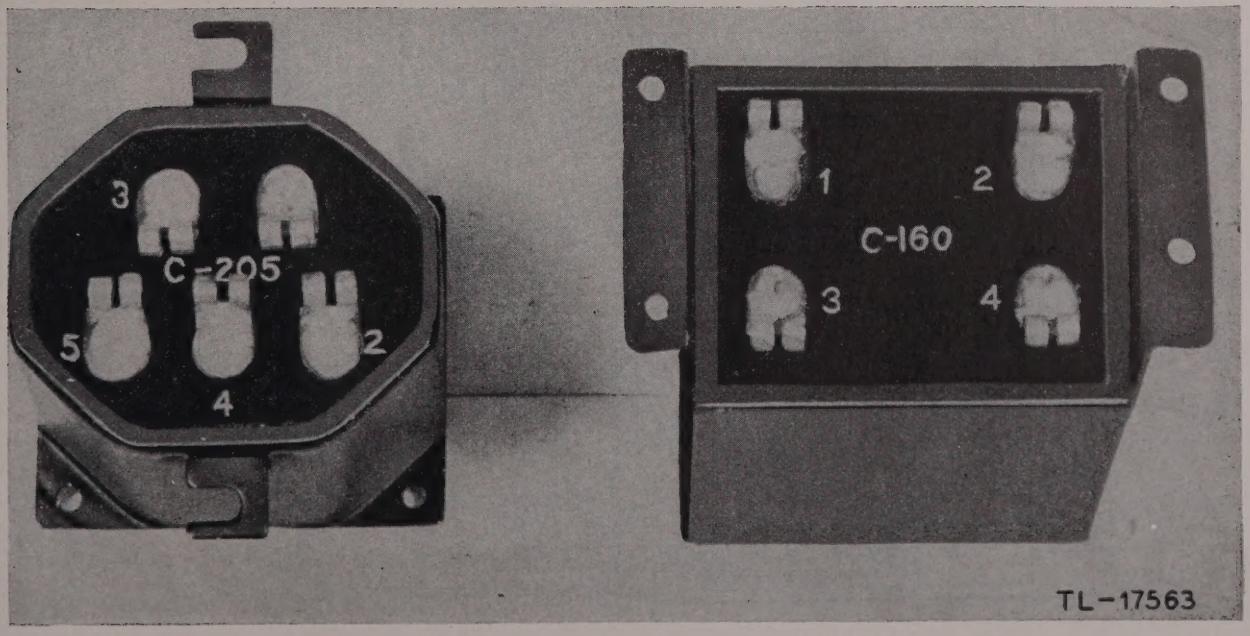


Figure 46. Transformers T1 and T2, terminals.

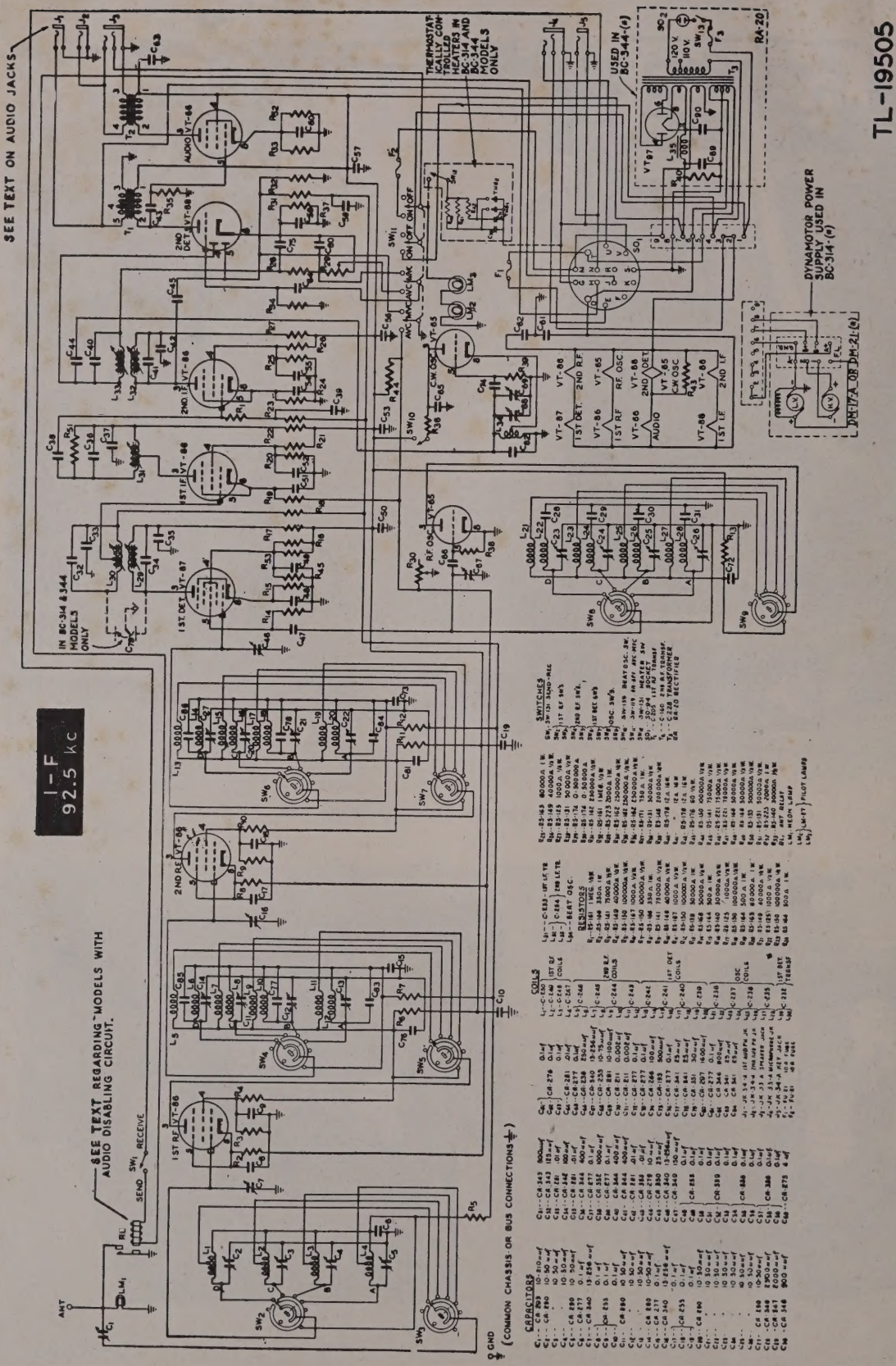


Figure 47. Radio Receivers BC-314-(*) and BC-344-(*), schematic diagram.

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